On The Competitiveness, Emergence and Regional Links of Financial Centres

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ABSTRACT

The purposes of this thesis are first, to provide a general framework to analyse the location of financial activity, second, to study the emergence and evolution of banking centres centres and finally, to test empirically several hypotheses related to banking centres and their links with regional economies. In the first part of the thesis, we examine the impact of information asymmetry on the degree of centralisation of banking activity by incorporating spatial factors in a model of credit rationing. We next discuss the main factors that push bank to locate near each other and explore how pecuniary externalities in the form of backward and forward linkages can generate a powerful agglomeration force in the banking industry. We also analyse the path dependence process in financial centres and the conditions under which this process can be broken. In the second part of the thesis, we make an important contribution to the literature by providing an original theoretical framework to explain the emergence and evolution of banking centres. Unlike the existing literature which attributes the emergence of banking centres only to differences in regulatory and tax structure or other inherent geographical attributes, our model emphasises the importance of economies of scale in financial intermediation as being the major determinant of emergence. This allows for an element of indeterminacy in the model and hence other factors such as historical chance or "first mover" advantage can play an important role in determining which country emerges as a financial centre. The theoretical framework is then extended to examine the evolution of cross border banking over time and the determinants of the nature of banking systems; issues which remain unexplored in the literature on banking centres. In the last part of the thesis, we provide an empirical analysis on the main determinants of banks' location using new data series and a novel empirical approach which takes into account the major features of banking centres. Finally, we provide a novel empirical analysis of the links between banking centres' financial development and regional economic activity, using Hong Kong as a study case.

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TO MY FATHER

Chapter 1 - Introduction

Banks have never confined their activities to the national economy. From the early days of their existence, banks have always engaged in international activity (Davis and Lewis, 1987). What immediately distinguishes the post war period from earlier periods however is the massive increase in the scale of banks' international operations. According to the BIS statistics, in 1977 banks' holding of international assets[1] amounted to 770.5 billion dollars, increased to more than 5 thousand billion dollars in 1987 and by 1998, international assets of banks amounted to more than 10 thousand billion dollars.

But the great increase in the volume of international banking is not the only feature that characterises the "modern" system of international finance. There have also been major structural changes in the nature of banking activities (Pecchioli, 1983). Many factors such as transformations in most economies' real sector, advancements in information and telecommunication technology, a general movement towards financial liberalisation, financial innovation, and higher competition within the financial sector have greatly affected the nature of international banking (Davis and Lewis, 1987; Pecchioli, 1983). In the early sixties, the bulk of traditional foreign banking[2], which consists mainly of providing credit for imports and exports purposes, was located in the home country. In the late sixties onwards, traditional foreign banking declined in importance, accounting only for 20% of total international banking assets. Instead, Eurocurrency activity[3] has dominated international finance

[1] International assets correspond to cross-border claims in all currencies plus claims in foreign currency. Cross-border claims refer to claims against non-residents (Byrant, 1987; Dennis, 1984).
[2] By traditional foreign banking, we mean claims made by non-residents in domestic currency.
[3] Eurocurrency is usually defined as the denomination of assets and liabilities of bank offices in currency other than the currency unit of the nation where the office is located i.e. claims in foreign currency against resident and non-residents.

accounting for more than 80% of total international bank assets. A related development in the last decade or so has been the massive increase in cross-border banking flows. This is reflected in the massive increase in the size of international banks' cross-border assets, which increased from 2.5 thousand billion dollars in 1985 to more than 9 thousand billion in 1998. It is important to note that most of these flows take place between developed countries. In fact, the ratio of cross border assets to total cross border assets against developing countries has declined dramatically from around 30% in 1980 to less than 14% in 1998. The reduction in the debt flows to developing countries was partially offset by an increase in private capital flows during the 90s.[4]

Securitisation, the process of turning bank loans into tradable debt, has also changed the nature of financing in international markets. During the late 70s and early 80s, bank financing constituted almost 85% of total net international financing. The ratio declined drastically during the period 1982-1986 due to the debt crisis and reached very low levels of 60% in that period. During the late 80s, the percentage of bank lending out of net international finance increased, and in 1990 the pre-1982 level was once again attained, but later in the mid 1990s fell again. By 1998, this ratio stood at only about 50% of net international financing (BIS, 1999). The declining importance of international bank lending has been met by an increase in the significance of international bond and Euronote financing which became very important elements of

[4] IMF (1999) cites some interesting figures: "Net private capital flows to developing countries trebled to more than $150 billion a year during 1995-1997 from roughly $50 billion a year during 1987-89. At the same time the ratio of private capital flows to domestic investment in developing countries increased to 20% in 1996 from only 3% in 1990" (p.1). It is important to note that foreign direct investment constitute the most important component of private flows during the 90s.

international financing, accounting for almost 50% of net international financing in 1998.[5]

The 1980s and 1990s have also witnessed an explosive growth in various types of financial transactions. During the last decade, the foreign exchange market has grown enormously. According to the latest BIS survey (1998a), the total reported foreign exchange market turnover[6] adjusted for local double counting reached an unprecedented level of a daily average of $1572 billion in April 1995, increasing to $1917 billion in 1998. These figures exceed by far the volume of international trade and total world's GDP. Another important feature of this market is the declining importance of spot transactions relative to outright forwards and foreign exchange swaps. In 1989, the turnover volume of spot transactions was larger than the turnover of outright forwards and foreign exchange swaps. In 1995 and 1998, forward instruments consolidated their leading position, pushing the share of spot turnover down to 44% in 1995 and 40% in 1998 (BIS, 1998). Within the former group, foreign exchange swaps continued to be the dominant instrument, overshadowing outright forwards by a large margin (BIS, 1998). The derivative market has also grown enormously. Increasing volatility in the world financial markets and financial innovation, which allowed investors to obtain a combination of desired return, risk and liquidity, have contributed greatly to the growth of this market. According to the BIS survey (1998), the average daily turnover of notional amounts of over-the-counter (OTC) derivative market activity amounted to $474 billion in 1998.[7] An

[5] It is important to note the increasing involvement of banks in the issue and purchase of debt securities.
[6] Data include spot, outright forwards, and foreign exchange swaps activity.
[7] These figures include only OTC derivative activity for two main categories: Foreign exchange derivative instruments (currency swaps and options) and single-currency interest rate derivative

accompanying development is the increasing volume of transactions in related payment and settlement systems which amounts to more than $10 trillion a day (White, 1999).

Although the massive growth of international flows, the major transformations in various markets, and the main risks and challenges associated with globalisation of financial transactions are well recognised in the literature on international finance (White, 1999; Smith and Walter, 1991; BIS, 1988b), the centralisation of international financial activity and financial players in a few major geographical locations is not. One stylised fact is that international financial activity has been centralised for a very long time in a few financial centres (Kindleberger, 1983; Daly, 1991). Chapter 2, which examines the geographical distribution of different types of financial services, confirms this observation. For instance, around 70% of cross border assets and liabilities are concentrated in the leading financial centres of the world (United Kingdom, United States, Japan, Germany and France, Hong Kong and Singapore). The geographical concentration of foreign exchange transactions is even more acute, for these centres capture more than 80% of global market turnover. The same pattern can also be observed in over-the-counter derivative activity where around 85% of total trading takes place in these centres. The available data on futures and options trading also suggest a similar pattern with more than 90% of this activity concentrated in the world's leading financial centres.

Some economists have argued that agglomeration of financial institutions and international financial activity in a few centres has a bearing on the functioning of the

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instruments (forward rate agreements, swaps, and options such as options on traded securities, interest

world economy. Reed (1983) for instance develops what he calls a "financial centre theory of foreign direct investment." By attracting large amounts of foreign assets and liabilities, he argues, financial centres are in a position to manage a global portfolio, create a market with high liquidity and provide investors with competitive returns on investment. In order to perform these functions efficiently, financial centres evaluate projects all over the world and monitor the activities of multinational borrowers, mainly multinational corporations (MNCs). Having the complex physical infrastructure, the skilled labour and the professional expertise, financial centres gather and analyse information which is essential for the evaluation of global investment opportunities on a continual basis. Based on this evaluation process, financial centres allocate resources towards and between MNCs and hence can determine the flow of foreign direct investment (Reed, 1983).[8] In a separate work, Reed (1989) explores the possible association between a financial centre's behaviour and interest rates. His basic premise is that financial centres have the power to influence or even determine the level of future interest rates. Based on this proposition, Reed explains how London's "misguided behaviour" of raising interest rates during the two oil shocks in the 1970s exacerbated the problems in the global economy.

In a less extreme position, Sassen (1991) describes the importance of these centres in terms of their role in organising the processes of production which have become

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rate options, interest rate cap, interest rate floor, etc).

[8] Reed argues that the " underlying determinants of foreign direct investment activity are best explained (and understood) by determining the motives and methods of evaluation employed by supranational financial centres as they appraise on continuing basis, the activity of internationally active institutions" (p. 223).

highly internationalised.[9] The increased mobility of capital and the structural transformations that have accompanied this stage, such as the dispersion of production all over the globe, the transnationalisation of ownership and the reorganisation of the sources of profits, required a new set of inputs that are capable of controlling, managing and organising these new production processes. In particular, the organisation of global production is made possible by the provision of financial services and establishment of a network of financial markets that speed up and extend the circulation of commodities and speed up the process of capital accumulation. These complex networks of financial institutions and markets show a high degree of agglomeration in a few financial centres enhancing the importance of these centres in the world economy.

The study of financial centres and the location of financial activity in general are also relevant for policy makers all over the world. In Europe, economic and financial integration raises questions about the future role of London as an international centre. Will European integration cause a greater dispersion of financial activity? Conversely, can London attract footloose international financial activity and reinforce its supremacy as an international financial centre? Or could we witness the decline of London and the rise of alternative centres such as Frankfurt and Paris? In Asia, the financial map has changed dramatically during the last two decades. During the 1980s, Tokyo established itself as one of the leading financial centres of the world. In the 1990s, Japan's position as international financial centre is much in doubt. During the last decade, Japan's shares of all types of financial activity have been declining. For instance its share of cross border liabilities declined from 18% in 1987 to 10% in

[9] Sassen describes the current stage of global production as characterised by "a complex duality: a

1997. In terms of foreign exchange activity, its share of global foreign exchange turnover has declined from 11% in 1992 to 8% in 1998. The same pattern is observed in the case of OTC derivative activity where Japan's share declined from 12% in 1995 to 9% in 1998. The most astonishing development however is the rapid decline of Japan's stock market turnover both in absolute and relative terms which did not only affect Japan's global position, but also its position relative to the region. The question is, can Tokyo maintain its position as a financial centre or has it declined with Japan's economic recession? This is an important question not only for policy makers, but also for economists since it raises other questions about the relationship between the domestic economy's strength and the centre's success, especially at times when the links between the strength of the domestic "real" economy and the success of an international financial centre in many countries have become very weak. Another important development in Asia is the future of Hong Kong under the rule of China and whether this is likely to affect its position as a financial centre. Also important is the impact of the recent crisis in the region on Hong Kong's financial development. Given Hong Kong's links with the region, one would expect the crisis to have an adverse impact on banking developments there. In the Middle East, the financial map is far from being settled. In the mid 1970s, we witnessed the decline of Beirut as a financial centre and the emergence of Bahrain as an important "collection" centre channelling surplus funds to Euromarkets. Nowadays, there are doubts about Bahrain's future as a financial centre. The deregulation of financial markets in many parts of the Middle East, structural transformations in international financial markets, and the poor performance of the regional economy raise questions not only about Bahrain's future as a financial centre, but also whether the existing conditions permit

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spatially dispersed, yet globally integrated organisation of economic activity" (p.3).

the region to maintain a financial centre whether in Bahrain or elsewhere (Fattouh, 1998).

The study of financial centres is also relevant in the context of many developing countries. Many governments in the developing world have engaged in deliberate policies aimed at attracting financial activity and financial institutions. These policies range from offering financial institutions regulatory and fiscal incentives (such as low taxes or no taxes on income, profits, earnings, and capital gains) to providing a complex infrastructure that facilitates financial institutions' operations. An important issue is whether there are any substantial benefits associated with attracting a large number of foreign banks which could justify such efforts. Few studies have assessed the impact of bank agglomeration in a centre on economic development (Bhattacharya, 1989; Chang, 1989; Johnson, 1976). These studies examine the ability of banking centres to generate local employment, revenues, and foreign exchange earnings to host governments. The impact of operating expenditures associated with financial activity such as salaries to bank employees, rents, administrative expenditures, and telecommunication expenses, are also examined in some of these studies. One trend in the literature emphasises the significance of such benefits and considers the establishment of a banking centre as a part of a development strategy aimed at the diversification of the economic base (Essayad, 1989). Despite the dominance of this trend in the literature, some economists are doubtful about banking centres' contribution to the domestic economy. For instance, some argue that foreign banks operating in these centres inhibit the development of the domestic financial

sector (Odle, 1981). Others consider that banking centres play a passive role in large economies (Verghese, 1989). [10]

1.1 Scope of the Thesis

Despite their importance, economists have not given the study of financial centres much attention.[11] This neglect is consistent with the absence of spatial dimensions from economic models in general; for example the main body of theories of trade, the firm or production fail to provide a coherent theory of the location of economic activity (Krugman, 1995). The neglect of the spatial dimension in economic models is mainly the consequence of the assumption of non-increasing returns to scale, which is widely used in these models. Fujita and Thisse (1996) argue that under the assumptions that there are non-increasing returns to scale and that resources are uniformly distributed, "the economy is reduced to a Robinson Crusoe type economy where each individual produces his/her own consumption" (p.342). In such a framework, any point in the map can form the basis of an autarkic economy, where goods are produced in small scale unless the economy is open to trade. It is obvious that in such a setting, the concepts of location and agglomeration become redundant (Krugman, 1995).

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[10] In this context, it is important to note that most of the debate has focused on the "direct" benefits and costs associated with establishing a banking centre. A more fruitful avenue to explore is to examine the indirect effects of attracting foreign banks. First, attracting foreign banks may allow national governments and domestic corporations to have a greater access to international capital markets. Second, foreign banks may improve the efficiency of the domestic banking system by inducing competition and introducing new banking practices and financial products. These two benefits are quite substantial and can provide justification for some policy makers to pursue policies aimed at establishing a banking centre. Recent work (Fattouh, 1999) examines empirically the impact of attracting foreign banks on the probability of a country's access to international capital markets. Fattouh finds that attracting foreign banks to a national economy improves local firms and national governments' chances of access to international capital markets, other things being equal. Using cointegration analysis and employing quarterly data from Hong Kong, Fattouh (1999) also shows that there is a stable relationship between the number of banks in a centre, the development of the domestic banking system, and economic development.

[11] The lack of interest to study financial centres was observed first by Kindleberger (1974) who wrote, "the formation of financial centres is no longer studied in economics" (p.1).

Despite the general neglect from economists, the literature on financial centres grew considerably during the last two decades. The initial and main contribution to this literature came from economic historians who were interested in explaining the major factors that contribute to the emergence of international financial centres and identifying the major agglomeration forces in financial activity (Kindleberger, 1974; Jones, 1992). For instance, Jones (1992a) provides a useful account of the history of banking centres in Asia and the Middle East. Based on this historical account, Jones (op.cit.) argues that the emergence of these centres rests on features such as stability, low tax rates, secrecy, etc. Once the centre is established, external economies of scale (agglomeration economies) would contribute further to the growth of the centre. Kindleberger (1974) argues that international financial activity is subject to economies of scale which would ultimately result in the supremacy of a single centre in each domestic economy. He goes on to argue that the same agglomeration forces are likely to generate a hierarchy of international financial centres with one or two centres at the top of the hierarchy. Kindleberger analyses qualitatively these processes in the context of European centres. Reed's study (1981) reaches similar conclusions regarding the hierarchy among centres. Using cluster analysis and data pertaining to 80 cities over the period 1900-1980, Reed provides a very comprehensive analysis on the evolution of financial centres and the development of hierarchy amongst these centres.

In the early 80s, the literature became dominated to a large extent by empirical studies. The rapid growth of multinational banking during the 70s and 80s has encouraged many economists to provide a general framework to explain the major

factors responsible for multinationalisation of banks (Grubel, 1977; Gray and Gray, 1981; Aliber, 1984; Sabi, 1987; Goldberg and Saunders, 1980, 1981). Part of this wide literature addressed the issue of bank location (Choi et al, 1986; Grosse and Goldberg, 1991). Given that multinational banks are likely to establish offices in major international financial centres, few surveys were constructed to examine in detail the centres' main features which are responsible for attracting banks (Daniels, 1986). Other studies employed econometric techniques to study the major determinants of banks' location (Choi et al, 1986, 1996). Despite their usefulness, these studies were not aimed at explaining financial centres and in a sense they are a product of a diffused literature on multinational banking. For instance, there have been no attempts to study systematically the major factors responsible for the centralisation of financial activity or analyse the emergence of these centres. In fact, most studies limited the study of financial centres to the analysis of the pattern of trade in bank offices. It is not until very recently that economists have provided a general theoretical framework to analyse the location of financial activity, building on the insights of industrial location theory (Davis, 1990) and the literature on information asymmetry (Scholtens, 1992).

The present thesis is a contribution to the study of banking centres.[12] It aims to study banking centres theoretically and empirically, focusing on several key issues:

[12] It is important to stress that in this thesis banking markets are broadly defined and comprise various activities such as international lending and borrowing, risk and liquidity management, advisory services, and trading and dealing in foreign exchange and derivatives markets. Based on this broad definition, it is possible to argue that banking markets dominate financial centres. Hence, although in the thesis, we use "financial centres" and "banking centres" interchangeably, the discussion is virtually about banking centres.

- The major processes responsible for the agglomeration and dispersion of financial activity and the conditions necessary for the operation of these processes
- The impact of distance on the bank-borrower relationship and the implication of this relationship on the degree of agglomeration of banking activity
- The path dependence process in financial centres and some of its possible consequences
- The major functions of banking centres, the conditions necessary for their emergence, and how these centres evolve over time
- The links between banking centres and their regional economies

In what follows, we provide a summary and layout of the main issues and arguments in the thesis.

1.2 Agglomeration and Dispersion Forces in Financial Activity

The first part of the thesis contributes to the existing literature by analysing systematically the major agglomeration and dispersion forces in financial activity, using insights from the theories of financial intermediation and economic geography. Given the importance of information in financial intermediation, chapter 3 analyses the impact of information asymmetry on the degree of centralisation of lending activity. Specifically, Chapter 3 addresses the following questions: Does information asymmetry act as a centralising or decentralising force? How does the location of the bank relative to the borrower affect the relationship between the two agents and what is the implication of this relationship on the degree of centralisation of lending activity? Which types of lending activity are likely to be associated with the emergence of financial centres? Finally, will recent advances in information

technology undermine the position of financial centres? In line with chapter 3, chapter 4 analyses the main agglomeration and dispersion forces in the financial industry, but without any reference to the bank-borrower relationship. Specifically, chapter 4 addresses the following questions: Why do banks want to locate near each other? Chapter 5 analyses the path dependence process in financial industry and the possible consequences of such a process on the location and agglomeration of financial activity.

1.2.1 Information Asymmetries and the Degree of Centralisation of Lending Activity

Recent models of financial intermediation stress the importance of banks as monitors and information gatherers (Stiglitz and Weiss, 1981; Diamond and Dyvbig, 1983; Williamson, 1986). Given the importance of information in financial intermediation, we study the impact of information asymmetry on the location of financial activity which requires that we examine first the interaction between information and distance. This is in contrast with existing models which analyse this relationship in a space - dimensionless world.

Theoretically, it is possible to distinguish between highly standardised financial products that require low investment in local information and non-standardised financial products which utilise information to a high degree. While the location of the bank relative to the borrower plays a minor role in the delivery of standardised products, we assume that the distance between the bank and the borrower still matters for the delivery of non-standardised financial products, mainly bank loans.[13] It is true that recent advances in information technology mean that much information can be

obtained at low costs, but the quality of information may deteriorate the further the bank is from the ultimate source of information i.e. the borrower. This may be the case because information is usually produced within a local context which can not be transmitted with the piece of information. Consequently, the ability of financial institutions to process and evaluate information in an efficient or even in an accurate manner is adversely affected (Porteous, 1995). Proximity is also important in cases where information produced is not highly reliable. In these cases, banks must collect their own information which requires direct contact with borrowers. This applies mainly to borrowers from countries in which there are doubts about the quality of information, the accounting and auditing procedures and/or the entire legal system. In these circumstances, even when information can be obtained cheaply due to advances in information technology, its usefulness is limited and hence banks will not be in a position to base their decisions on such information. The costs involved in the monitoring stage can also be highly location dependent since the information required at that stage is highly non-standardised (Porteous, 1995). Obtaining such information may require frequent visits to borrowers which is costly in terms of time and transportation. These costs may increase in cross-border banking since banks may face additional costs arising from dealing with a different legal system and institutional infrastructure.

Chapter 3 analyses the lender-borrower relationship using Wiliamson's (1986, 1987) model of credit rationing. Under the assumption that monitoring costs are increasing and convex with distance (Porteous, 1995), it can be shown that there is a distance

[13] An implicit assumption in this discussion is that non-standardisation is due to information asymmetry.

(d)* beyond which a bank may decide to ration credit to certain borrowers. [14] In other words, the location of the bank relative to the borrower can affect the profit function of the former and/or the latter's access to credit.[15] Hence, banks may have the incentive to locate near borrowers, especially if the bank wants to increase its share of the credit market.

The idea that banks want to locate near their main borrowers has been analysed in the context of the theory of bank multinationality. It its crudest form, this theory applies the elements of manufacturing multinational corporation (MNC) theory to the banking firm, with a few modifications to take into account the importance of trust and information in the business of banking (Dunning, 1988). One important hypothesis that emerges from this literature is that a bank has the incentive to follow its main borrowers abroad in order to maintain an "ownership advantage" in terms of information stock (Gray and Gray, 1981). Despite its usefulness, the "eclectic" approach to bank location suffers from many shortcomings. For instance, in this paradigm, the decision of banks to locate near their main borrowers is not optimal. As in the case of manufacturing firms, the decision of banks to locate near multinational borrowers is mainly to protect their market shares from local and other foreign banks. More importantly, this paradigm neglects many special features of financial intermediaries such as their monitoring and information processing functions and treats the bank as any other manufacturing firm.

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[14] This analysis has wider social and economic implications at the national level. Chick and Dow (1988) for instance develop a model in which low credit to borrowers in the periphery results in low growth in that region which in turn would translate into low demand for credit. In this thesis, the emergence of national centres and the regional effects of financial activity are not discussed. Instead, the analysis is limited here to international financial centres. Specifically, we study the impact of information asymmetry on the agglomeration of international financial activity.

[15] It is important to note that distance does not necessarily refer to mere geographical distance. It is more general and captures features such as language and culture, consistency of accounting standards, similar business environment, etc.

Using recent models of financial intermediation to analyse the lender-borrower relationship permits an examination of the impact of information asymmetry on the degree of centralisation of lending activity. But first, it is useful to make the distinction between retail and wholesale banking. Retail banking involves dealing with households and small and medium firms which are numerous and distributed all over the world while wholesale banking deals with fewer borrowers, mainly MNC headquarters, other banks and wealthy individuals. Given that retail borrowers follow a scattered distribution, non-standardisation, due to information asymmetries, can act as a powerful dispersion force in lending activity. In fact, existing evidence suggests that despite the fact that many retail products are "technically tradable" and hence do not require proximity between the bank and the customer, actual trade in most retail products is negligible (UN, 1994). Hence, in order for banks to establish a competitive edge in other markets, they must have a wide network of bank offices. As such, the emergence of financial centres can not be linked to the internationalisation of retail banking which occurred all over the world. On the other hand, wholesale banking shows a high degree of centralisation. Many of the wholesale customers such as MNC headquarters and other financial institutions are headquartered in few financial centres. Furthermore, many of the wholesale banking products are more standardised than retail financial products.[16] These two factors contribute to the centralisation of wholesale banking and hence by locating in a certain geographical location (i.e. a financial centre), a bank can service its regional borrowers without its optimal profits being affected. Hence, it is legitimate to conclude that wholesale banking activity is the main activity associated with emergence of financial centres. In fact, the

[16] Exceptions are OTC derivatives and swaps which are non-standardised.

internationalisation of wholesale banking was manifested in the emergence of these centres.

1.2.2 Information Technology: An Agglomeration or Dispersion Force?

The tension between centralisation and decentralisaton within the financial industry has been intensified by recent developments in information technology. The "end of geography" thesis may suggest that recent advances in information technology undermine the location of financial activity and as a consequence it renders financial centres obsolete by exerting pressure on the financial industry towards decentralisation (O'Brien, 1991). In the first instance, the argument seems valid. After all, recent advances in information technology mean that financial institutions could obtain all the relevant information from a distance at a very low cost. However, the impact of information technology on the financial industry is not that straightforward. Information technology can also enhance centralisation (Martin, 1992). Being able to provide services at a distance means that banks can service far away customers from a centre and at the same time benefit from the various externalities that financial centres can offer. It was argued in the previous section that banks by locating in regional financial centres are able to provide their service to regional borrowers without their cost structure being affected. As far as this type of activity is concerned, advances in information technology do not necessarily undermine these centres. On the contrary, information technology may have intensified the centralisation of this type of activity by reducing the cost of obtaining information about these borrowers. In the case of transparent financial services, information technology can enhance the degree of centralisation. It is true that the provision of these services does not require physical proximity to the market or the customer, but precisely because of this fact banks can

provide these services from a financial centre and benefit from other externalities that arise from centralisation such as access to deeper and more liquid markets, highly specialised intermediate inputs and skilled labour, and highly sophisticated public infrastructure.

The treatment of the financial firm as a single entity obscures an important aspect of the impact of information technology on the financial industry. In fact, the impact of information technology has been significant on the separation of front office activities (funding, raising capital, issuing bonds, etc.) from back office activities (data processing, check processing, credit card operations, etc.), which traditionally were located together or near each other. Some banks have already shifted part of their back office activities to cheaper locations. This was made possible by recent advances in information technology which enabled managers to connect different parts of the bank. However, this separation effect has been limited only to a small number of large banks. Other factors such as lack of resources and unavailability of skilled labour seem to prevent the relocation of small and medium sized banks to more cost-effective locations. As far as front office activities are concerned, these still show a high tendency to centralise mainly because sunk costs in terms of loss of established relationships with main borrowers and other banks remain substantial (Jacobs et al, 1990; Edwards, 1998).

1.2.3 Informational Spillovers Among Banks as an Agglomeration Force

A major agglomeration force can be found in the existence of externalities. It is usually the norm to distinguish between two types of externalities: Technological externalities and pecuniary externalities. Technological externalities refer usually to

non-market interactions which can affect directly the production function of a firm or the utility function of a consumer. Pecuniary externalities on the other hand occur through market interactions via the price mechanism (Krugman, 1991). Although both types of externalities can create agglomeration forces, the literature on financial centres has mainly focused on technological externalities. Specifically, studies that deal with financial centres usually equate technological externalities with informational spillovers among banks (Davis, 1990; Code, 1991). The main argument is that face to face contact and physical proximity still form the major source of information (Code, 1991). In a similar vein, Davis (1990) argues that informational spillovers reduce the costs associated with information asymmetry. These effects are likely to increase the size and enhance the liquidity of interbank markets providing banks with an incentive to locate near each other. These arguments are based on the assumption that spillovers between banks decline rapidly with distance.

There are two main shortcomings of such explanations that are worth mentioning in this introduction. The first is that this type of externality enters the model as an imposed or arbitrary assumption. Second, it is very difficult to quantify the importance of these informational spillovers or their influence on the degree of bank agglomeration.

1.2.4 Demand for Specialised Intermediate services as an Agglomeration Force

Another type of externality, pecuniary externality, has been neglected as a possible source for agglomeration in financial activity. As Krugman (1991) emphasises, pecuniary externalities are real and are as important as technological spillovers in explaining the economics of agglomeration. For instance, linkages between the

financial sector and the intermediate service sector can generate a powerful agglomeration force in both industries. This aspect of agglomeration however is not fully explored in the literature on financial centres. There are two main reasons for this neglect. The first is related to the fact that pecuniary externalities do not coexist with a competitive market structure. Under the assumption of perfect competition, all firms are price takers and hence the benefits of interaction can not arise through the usual market mechanism via the mediation of prices (Krugman, 1991). Hence, in order to examine the impact of pecuniary externalities on the agglomeration of economic activity, it is essential to assume imperfect competition and increasing returns to scale in production which complicates the analysis since it introduces non-convexities. The second factor is related to the fact that the financial industry is usually considered as part of the producer services sector (Daniels, 1993). While credit products such as loans can be considered as inputs necessary for the production of a firm, many types of financial products (shares, bonds, option, etc) are closer to commodities rather than to intermediate inputs in the sense that utility from these services is not obtained from their consumption like in the case of other services such as accounting or advertising, but from their tradable nature. The main implication of such treatment of financial services is that it does not allow for the possibility of identifying a distinct producer service complex in financial centres similar to the one found in industrial centres (Sassen, 1991).

Taking these two factors into account and using the insights of the emerging literature of economic geography, chapter 4 provides a model in which financial firms' demand for differentiated services can generate a powerful agglomeration force in the financial industry. In particular, agglomeration of financial activity, which creates a

localised demand, can support the establishment of a highly specialised service complex which in turn improves the productivity of financial institutions. This process has been recognised previously in the literature on international financial centres (Davis, 1990; Daniels, 1986; Grilli, 1989). However, the conditions under which these channels operate were not explored or formalised. The model developed in *Chapter 4* fills this gap in the literature. The model shows that in order for this agglomeration force to work, certain conditions are required the most important of which is that the *intermediate sector must operate under conditions of monopolistic competition*. Without the assumption of imperfect competition, agglomeration forces of that type can not arise. This fact has been completely ignored in the qualitative and historical analysis of financial centres.

1.2.5 Demand for Skilled labour as an Agglomeration Force

The provision of financial services depends to a large extent on a highly qualified and specialised labour force. In fact, Walter's survey (1988) shows that skilled labour is the most important input for the provision of most types of financial services. Hence, the desire to acquire skilled labour can provide an incentive for banks to locate in certain geographical areas. There are strong reasons to think that agglomeration of financial institutions allows for a pool of highly skilled labour (Grilli, 1989). First, competition among a larger number of banks may push wages upward in the market for skilled labour giving an incentive for skilled labour to centralise around these firms. Second, skilled workers have the incentive to centralise around a cluster of banks because the probability of being unemployed is much lower than other areas characterised by smaller number of banks.[17] Finally, a market for skilled labour

[17] This result is attained because of the assumption of uncertain demand for labour.

provide banks with incentive to locate near that pool not necessarily because wages are lower, but because the availability of skilled labour increases the expected profit for banks providing them with the incentive to locate near a pool of skilled labour.[18]

1.2.6 Path Dependence as an Agglomeration Force

Financial centres are also characterised by path dependence which could act as a powerful agglomeration force. Path dependence can be defined as a process in which the initial conditions of the process determine the outcome (Porteous, 1995). To put it differently, once a centre has established an early advantage, it can sustain that advantage over a long period of time. Despite its importance, path dependence has been largely ignored in the literature on financial centres (with the exception of Porteous, 1995). Using the general framework suggested by Arthur (1988a,b, 1989), Chapter 5 contributes to the existing literature by examining in detail path dependence in the financial services industry and some of its possible consequences. One such consequence is that that the location of economic activity can no longer be explained solely by economic determinism. We can show that one region is able to "lock-in" financial activity, but we can not predict which region will assume this role since self-reinforcing mechanisms create multiple solutions for the location problem.

Many factors interact to determine the location of financial activity. These factors can be purely geographical, historical, institutional, or cultural (Grilli, 1989). Arthur (1988a) focuses on "historical chance" as a very important determinant of the location of economic activity. Although chance may have contributed to the emergence of a

[18] For instance, financial firms' access to professional expertise in the major international financial centres is cited as the main factors responsible for the centralisation of derivative activity in those centres. The incapability of other banking centres such as Hong Kong and Singapore to increase their share of derivative activity is due to the lack of such professional expertise (Cassard, 1994).

certain city as a financial centre, there is no doubt that there are some inherent characteristics or geographical benefits in a location that have attracted the "first movers". Chapter 5 describes few of these inherent static characteristics suggested in the literature. It is argued that the static approach resulted in a very fixed understanding of financial centres while in reality financial centres are dynamic establishments. This suggests that some locational advantages can become obsolete while others may be created and hence the importance of introducing dynamic advantages into the picture.

The introduction of dynamic locational benefits into the model is also required to deal with another major shortcoming of Arthur's framework; the issue of path dependence reversal. Specifically, the general framework does not allow for the path dependence process to be broken, but historical and empirical evidence suggests that shifts to a new negative growth path do occur. An important example is Beirut which has lost its role as the financial centre of the Middle East as a result of strong shocks, mainly political instability and civil war. Another example from the same region is Bahrain which has failed to diversify its financial infrastructure and has lost a large part of its banking activity to other centres. Unlike Beirut, Bahrain did not witness a strong shock, but rather a series of small shocks. The empirical evidence presented in Chapter 2 also suggests that the importance of Japan as a financial centre has declined considerably. Such evidence suggests that shifts to a new negative growth path do occur and hence the above framework must take into account this fact if it is to be applied to financial centres.

Chapter 5 identifies there locational dynamic advantages. These are the ability of the centre to reduce the cost structure of financial firms, to generate profitable business opportunities and to attract information flows. It is argued that these features are the major determinants of the location of financial activity and more importantly these features are dynamic in the sense that they can change over time. Hence, their inclusion in the general payoff function allows the possibility of a shift to a new negative growth path. Specifically, if these benefits decline overtime due to strong shocks -such as war, political instability, severe crisis- or due to a series of cumulative shocks, enough to offset the benefits that arise from agglomeration, a financial centre can find itself on a negative growth path.

1.3 Emergence and Evolution of Financial Centres

Recent movements towards liberalisation of financial services and implementation of financial sector reforms in many parts of the world have intensified the degree of competition in the provision of financial services. One aspect of this competition has been manifested in the increasing importance of cross border banking flows i.e. the flow of deposits and loans between geographical regions. Financial centres play a vital role in the process of transferring funds between geographical regions. In fact, it could be argued the network of financial centres was established in the first place to overcome the barrier of distance.

Despite their importance, the literature has provided very few theoretical models to explain the emergence and function of these centres. In fact, these important aspects of financial centres were mainly analysed by economic historians (Jones, 1992a,b) although recently some economists have analysed this aspect in a more formal

manner. The historical studies have identified many conditions that a geographical location must satisfy in order to emerge as a financial centre. These conditions can be very general (strategic location, historical character, political stability) or more specific (favourable regulatory and tax environment for the financial industry). Recent theoretical work explains emergence in terms of differences in regulatory and tax structure (Eaton, 1994; Cassard, 1994). Countries with lower tax rates and flexible regulatory environment, reflected for instance in lower reserve requirements tend to have lower spreads and hence would specialise in the provision of both deposits and loans. For instance, in Eaton's (1994) over lapping generation model, countries in which monetary authorities place less weight on seigniorage revenue (i.e. systems which rely less on the taxation of the financial system) can achieve higher rates of return on deposits and lower rates of return on loans. As a result, such countries are able to attract deposits from abroad and finance non-resident borrowers.

Chapter 7 contributes to this literature by providing a theoretical model to explain the emergence and evolution of financial centres. Specifically, it addresses the following questions: What are the main conditions required for a country to emerge as a financial centre? How does the function of these centres evolve over time?

Although the model analyses the emergence of financial centres in general, it focuses more on regional banking centres (such as Hong Kong, Singapore and Bahrain) which play an important role in linking regional domestic capital markets to international capital markets (Hodjera, 1978). These links can take three important forms (Eaton, 1994). First, a banking system may be acting as a financial intermediary for the region or the rest of the world by attracting deposits and then channelling these funds as

deposits and loans to non-financial enterprises in their regional economies or to that same region where funds were attracted from originally. These countries we refer to as regional banking centres. Second, a banking system may be attracting both loans and deposits from international financial markets. We refer to this type of banking systems as inward transformers which are likely to emerge in countries with large investment opportunities such that an inflow of deposits and loans are required to meet the demand for credit. Finally, a banking system may be transferring funds from domestic economies to international financial markets both by depositing and lending funds abroad. These centres are mainly known as collection centres or outward transformers which are likely to emerge in countries with excess savings and little investment opportunities or low absorptive capacity (Eaton, 1994).

In our model, the emergence of banking centres is based on a combination of efficiency and economies of scale in intermediation. In our story of emergence, we capture three important features of financial centres. The first feature relates to the possibility of indeterminacy. In cases where the centres do not have the required amount of savings to fund a critical mass of investment opportunities, the emergence of a certain country as a financial centre is not straightforward. Unless a centre is able to attract a certain critical mass of saving from a sufficient number of countries, it will not emerge as a regional centre. A second related feature is that it is not necessarily true that the country which provides the most efficient intermediation would necessarily emerge as a regional centre. A country with less efficient financial intermediaries can also emerge as a regional centre although the amount of savings needed to be intermediated through the centre must be larger for such emergence to occur. This allows for some element of indeterminacy in the model. This aspect of

emergence has been neglected in the literature on financial centres. The third feature relates to the possibility of a reinforcing mechanism which allows for the case that once a centre has been established, it would continue to attract funds to the region unless a strong shock occurs which reverses the flow of savings. This is much related to the concept of path dependence which was discussed previously in section 2.

Chapter 7 makes an additional contribution by examining the evolution of cross border banking flows. Specifically, it tries to explain the various categories of banking systems. Under certain assumptions related to transferability of knowledge, it is possible to identify three possible processes of cross border lending activities. In case of complete transferability of knowledge, domestic and cross-border lending activities tend to co-exist. In other words, the intermediary would finance both domestic and foreign production. This situation can go on indefinitely as long as the economy is not saving constrained. On the other hand, when transferability of knowledge is incomplete such that countries can grow at different rates, a financial intermediary could polarise and as a consequence two extreme cases can emerge by which the financial intermediary either supports domestic production (an extreme case of an inward transformer where the intermediary transforms all foreign inflows into domestic loans) or foreign production (an extreme case of an outward transformer where the intermediary transforms all inflows into foreign loans).

1.4 Empirical Literature

The last part of the thesis examines empirically some hypotheses that emerge from the theoretical discussion of previous chapters. Specifically, chapter 6 provides empirical evidence on the major determinants of banks' location in a centre while chapter 8

provides empirical evidence on the links between banking centres and regional economic activity, using Hong Kong as a study case.

1.4.1 Determinants of Financial Centres' Competitiveness

Empirically, the issue of bank location has been approached in two complementary ways. The first approach consists of organising open interviews with bankers and constructing questionnaires aimed at identifying the major factors that push multinational banks to establish bank offices in financial centres (Daniels, 1986; Ter Hart and Piersma, 1990). The second approach uses econometric analysis to study the major determinants of the location pattern of the world's largest banks across centres (Choi et al 1986, 1996) or to examine the major factors responsible for banks locating in major international financial centres, mainly New York and London (Grosse and Goldberg,1991; Fisher and Molyneux, 1996).

Despite its usefulness, empirical work on financial centres remains highly scattered and highly uninformative. Given the large number of hypotheses these studies attempt to test, one can not reach definite conclusions regarding the major determinants of financial centres' competitiveness. The only explanatory variable that seems to be significant in most studies is the volume of trade. That is to say that countries with large volumes of trade are likely to attract large number of banks and higher levels of financial activity and/or trade links between countries are likely to result in trade in bank offices. *Chapter 6* provides a critical review of the empirical literature which allows us to identify the major determinants of the competitiveness of a financial centre and to examine the main problems associated with testing empirically these determinants. As will become clear from the discussion, these studies were not aimed

at explaining the existence of financial centres and in a sense they were a product of a diffused literature on multinational banking. For instance, there was no attempt in these studies to address systematically the major features of financial centres and instead this empirical work limited the study of financial centres to the study of pattern of trade in bank offices.

Chapter 6 addresses the issue of bank location using a different approach which takes into account the special features of financial centres and is based on the theoretical discussion of previous chapters. Specifically, rather than examining banks' location all over the world, which is more related to the internationalisation of retail banking activity, the focus of this chapter is on the factors that determine banks' decision to establish in the world's leading centres. The alternative approach also rests on the observation that financial activity related to trade or foreign direct investment should not be considered as the main component of financial centre's activity (Brealey and Kaplanis, 1996; Thrift, 1987). Instead, according to the models developed in this thesis financial institutions also locate in financial centres in order to access the centres' financial markets and to benefit from the various externalities that these centres offer, such as access to deeper and more liquid interbank markets, specialised intermediate inputs and a highly skilled labour force. Using data from the largest fifteen centres in the world, we test whether after controlling for bilateral trade, foreign direct investment, and size of the country of origin, *agglomeration benefits and greater access to deeper and liquid markets are important determinants of banks' location in a centre.* In order to test for this hypothesis, an agglomeration-diversity index is constructed using new data series.

This chapter makes additional contributions to the literature which are worth mentioning in this introduction. First, it differentiates between the different forms of physical presence. We expect the impact of the explanatory variables to be different across branches, subsidiaries, and representative offices. Second, this chapter utilises more than one econometric technique (linear and probit and logit estimation) to test for the proposed hypotheses. Because of the nature of the hypothesis being tested, it would be more meaningful to examine the impact of explanatory variables on the probability that a bank would establish in a certain centre. The probit and logit models used in this chapter allow us to carry such an exercise.

1.4.2 Links Between Banking Centres and Regional Economies

The fact that banking centres are linked to regional economic activity is well recognised in the literature. However, few attempts have been made to formalise this feature of regional centres.[19] Equally important, there have not been any attempts to establish empirically the links between a banking centre's level of financial development and regional economic activity. Chapter 8 contributes to the literature by providing empirical evidence on the links between Hong Kong's banking activity and regional economic activity. Specifically, we explore this relationship using two pieces of empirical evidence. First, we examine the relationship between the number of banks in Hong Kong and regional trade. We test for the hypothesis that the large number of banks in Hong Kong is associated with regional trade activity, rather than bilateral trade. The second piece of empirical evidence examines the relationship between financial and economic development in the case of Hong Kong. One major feature of banking centres is the size of their banking system which is usually much

[19] This issue was discussed extensively in section 5.

larger than the size of their local economies. More importantly, the banking system is likely to be linked with its regional economies. As suggested in this introduction, the strength of the national economy is playing a diminishing role in the success of a centre. Any empirical analysis that examines the relationship between financial and economic development must take into account these two important features. In order to do this, we distinguish between the level of development of the domestic banking system and that of the external banking system. We also introduce regional economic activity into the picture. We expect domestic lending activity to be linked with domestic economic development, but not necessarily with regional economic activity. On the other hand, we expect a centre's financial development to be linked with the region's economic activity. Hence, we test for two related hypotheses. The first concerns the relationship between domestic economic and financial development. This is in line with the existing empirical literature on finance and development (Arestis and Demetriades, 1997). The second hypothesis concerns the relationship between external banking development and regional economic activity. In chapter 8, these two hypotheses are tested jointly using cointegration analysis.

1.5 Conclusion

This introductory chapter has set out some of the issues and questions that have motivated this thesis. It also provides a summary and layout of its main arguments. Specifically, it sets out the problem of the location of financial activity in terms of agglomeration and dispersion forces in the financial industry. It also discusses the issues of emergence and evolution of financial centres. Finally, it states the main hypotheses that we intend to test empirically.

Chapter 2 - Centralisation of International Financial Activity: Some Empirical Evidence

2.1 Introduction

As a first attempt, financial centres can be defined as geographical locations where financial activity and financial institutions centralise. This definition however obscures some important aspects of financial centres. First, it is not clear what is meant by "financial activity" in the above definition. In order to arrive at a more accurate definition of a financial centre as well as to make a useful distinction between the different types of centres, it is important *not* to treat financial services as a homogenous category. [1] Instead, it should be stressed that financial services are diverse. Financial services utilise inputs such as skilled labour and local information at different intensity and require different modes for their delivery either through a physical establishment or by trade.

Second, the above definition does not take into account the heterogeneous nature of the centres themselves. The conditions under which financial centres emerge and their roles vary considerably across centres (Kindleberger, 1974). More importantly, the functions and the variety of services offered by these centres and the complexity of their financial structure differ substantially. This heterogeneity principle does not apply only when comparing financial centres in developing countries with those of the developed world, but also among financial centres in the developing world.[2] A similar treatment of financial centres without any attempt at differentiation would seriously

[1] Lee et al (1992) argue that " the category financial services can not be regarded as a rational abstraction or taken to indicate a unitary set of activities."

[2] This has also been emphasised by Byrant (1987) who argues that " the offshore financial centres are diverse in nature... A careful analysis of the offshore centres should differentiate among them according to their economic and financial structures and the types of regulatory, tax, and supervisory environments they have established." (p. 140).

limit our understanding of the nature of these centres and the determinants of their competitiveness.

Third, the above definition obscures the fact that financial centres are not locally oriented in the sense that they do not provide services for their local national economy only, but mainly extend their services to regional clients. However, the ability of these centres to provide services to their regional clients depends primarily on the nature of the financial product. In particular, it depends on whether the provision of the financial product requires heavy investment in local information and on the ability of financial institutions to acquire the necessary information without increasing financial institutions' cost structure or affecting their profitability.

Finally, the above definition does not specify the customers that are likely to demand financial centres' services. These customers do not form a homogeneous group. The distinction between different types of customers, such as the distinction between retail and corporate customers, is important because the nature of information required in the provision of a financial service and its tradability depend to a large extent on the type of customer.

This chapter has two main objectives. First, it provides the empirical background for the problems examined in subsequent chapters. Specifically, this chapter establishes some stylised facts regarding the centralisation of international financial activity. Second, based on the empirical evidence, this chapter analyses some of financial centres' main features discussed above.

This chapter is divided into three main sections. In section 2, a classification of international financial services is presented, while section 3 provides empirical evidence on the extent of centralisation of different types of financial activity. In the last section, a distinction between banking centres and international financial centres is made. The last section contains my conclusion.

2.2 Diversity of Financial Products

Financial institutions provide a very wide range of financial services which makes it very difficult to examine each financial product on its own. Given this constraint, this chapter adopts a more functional approach. This approach consists of grouping different types of international financial services into a few categories. Based on Smith and Walter (1997) and UN (1994), it is possible to classify international financial activity into the following categories:

a. *Credit and deposit taking activity:* This activity still forms the core of banking business. Credit activity varies from extending loans to small customers to a more specialised form of funding such as export financing, or syndicate lending. Deposit taking activity consists of offering deposits of different maturities (current account, time deposits, demand deposits, overnight etc.) sizes (CDs, retail deposits), and marketability or liquidity.

b. *Advisory Services*: Financial institutions provide advisory services to meet the complex needs of their clients. The products in this category vary from corporate cash management and general corporate financial services to more specialised services such as real estate and trade advisory services.

c. *Liquidity Management*: Due to the increased volatility of international financial markets since 1973, customers have increased their demand for services in the area of risk and liquidity management. Financial institutions offer a variety of products such as swaps, options, and futures that enable customers and financial institutions to shift various types of risks (credit risk, interest rate risk, foreign exchange risk, country risk, etc.) to those who are willing to assume them.

d. *Trading and Dealing*: Financial institutions are active traders in many markets such as the foreign exchange market, securities market, bond market and interbank markets. Financial institutions trade on behalf of their customers such as importers, exporters, and multinational borrowers or for their own account.

e. *Payment clearing activity*: Financial institutions provide a variety of financial products for effecting payment transactions. These products are diverse (cheques, debit cards, bank drafts etc.) and can be tailored to meet the demands of their customers (letters of credit, international collections). This category also includes payment transfers such as domestic funds transfer, international fund transfers as well as international payment clearing.

Table 2.1 shows the main products involved in each of these categories. Two points are worth mentioning regarding this classification. First, the categories suggested are not rigid in the sense that a few financial products can be grouped under more than one category. Second, this categorisation does not include all types of financial

services. Given that the main objective of this chapter is to study aspects of the centralisation of financial activity, these problems of classification are not binding.

Table 2.1 - Classification of International Financial Products

Lending Activities	*Advisory Services*
Financial Loans	Corporate Cash Management
Equity Financing	Corporate Fiscal Planning
Export Financing	General Corporate Financial Services
Project Financing	Real Estate Advisory
Venture Capital Financing	Mergers and Aquisition
Real Estate Financing	Legal and Investment Advisory Services
Leverage Buyout Financing	General Financial Advice
Liquidity and Risk Management	***Trading and Dealing Activity***
Swaps	Money Market
Futures	Securities
Options	Foreign Exchange
Forwrad contracts	Swaps
Payment Transactions	Futures
Funds Transfer (Domestic and International)	Options
International Collections	Bullion
Letters of Credit Business	

Based on Smith and Walter (1997) and UN (1994)

The distinction between different types of financial services has three major benefits. First, it allows us to make a useful distinction between the various types of financial centres. In particular, the diversity of financial services, which also reflects the complexity and level of the development of financial markets, is used to differentiate an "international financial centre" from a "banking centre". Second, this distinction allows us to examine more accurately the fact that centres specialise in different types of financial activity. Finally, treating financial services as a heterogeneous category enables us to specify what types of financial activity are likely to show the highest degree of centralisation. In order to capture more fully the extent of these benefits, it is useful that we first provide some empirical evidence on the extent of centralisation of different types of financial activity. The evidence would also help us establish some stylised facts regarding the centralisation of financial activity.

2.3 Centralisation of International Financial Activity: Empirical Evidence

This section provides empirical evidence on the agglomeration of different types of financial activity. When data permit one or two main activities are chosen for analysis from each category specified in the previous section. Other than the fact that it is not possible to provide empirical evidence on all categories of financial services due to data unavailability, there are other general data problems that should be emphasised. First, data are not presented with respect to the same reference year or period. For instance, data on international bank lending are compiled regularly by the Bank for International Settlements (BIS) in its Quarterly Review, *International Banking and Financial Market Developments*. Hence, it is possible to provide time series data on the concentration of cross border assets which allows us to examine the change over time in the geographical distribution of international lending. Data on foreign exchange and over-the-counter derivative activity, on the other hand, are collected once every three years. In some activities, such as bond trading, data are available for one year or two years at most. In such cases, it is not possible to examine the major developments in the geographical distribution of financial activity over a period of time.

Second, data are obtained from different sources. This usually affects the extent of coverage as well as certain definitions. For instance, BIS provides data on the developed world and major offshore centres, excluding countries with insignificant amounts of international financial activity. The International Financial Corporation (IFC) in its annual report *Emerging Stock Markets Factbook* provides data on stock market capitalisation and turnover from developed and emerging markets. The unit of analysis in both these sources is the whole country rather than a city in that country.

On the other hand, the Federation Internationale des Bourses De Valeures (FIBV) divides countries according to their time zone rather than their level of development. Furthermore, FIBV provides data on main stock exchanges' activity only. Since these exchanges are located in cities, data obtained are at the city level rather than at the country level. However, given that comparisons are made only using data from the same source and the fact that financial activity tend to show a high degree of centralisation within a country, such data problems do not restrain us from drawing some conclusions regarding the centralisation of financial activity.

The last and most serious limitation is that in some markets, data on market activity do not include over-the-counter market activity. Given the growing importance of OTC activity, this is quite binding since it is not possible to determine with accuracy the actual size of the market. This is particularly binding in the case of bond turnover data where most trading in international bonds is over-the-counter.

2.3.1 Credit and Deposit Taking Activity

In this category, the focus of the discussion is on international bank lending and deposit taking. Cross border lending and deposit taking constitute the major parts of international banking and hence can give us an indication of the centralisation of international banking activity.

Cross Border Lending

Cross border assets consist of claims against non-residents including banks and non-banks both in domestic and foreign currency. The geographical distribution of cross border assets (or external bank lending) can act as a comprehensive measure of

centralisation of international banking activity. Table 2.2 reveals the following facts regarding international lending. First, the bulk of cross border bank assets are centralised in the major financial centres of the developed world (United Kingdom, United States, Japan, France and Germany). In 1998, these centres captured more than 55% of the world's cross border assets. Another interesting observation is the declining share of major developing world banking centres (Singapore, Hong Kong, Bahrain and the Caribbean Islands). In the early 1980s, banking centres' share of total cross border assets was 25%. In the last decade, as a result of the shift of cross border assets towards financial centres of the developed world, the share of banking centres in the developing world declined considerably and by 1998, their share of world's cross border assets stood at below 20%. Second, the degree of geographical concentration of cross border assets within the developed world is very high. In 1998, the major financial centres of the developed world (United Kingdom, United States, Japan, France and Germany) constituted around 70% of cross border assets with UK's share alone accounting for 25% of total cross border assets in the developed world. This makes the UK the biggest centre for international lending, followed at a distance by Japan, Germany and the United States. It is noteworthy that in 1998, Germany has surpasses the US as the 3rd banking centre. Third, in the developing world, the supremacy of Hong Kong and Singapore is evident. In 1998, Hong Kong and Singapore captured around 10% of total cross border assets. However, as the table 2.2 shows, Hong Kong's share has been declining recently. While in 1994, Hong Kong was the third biggest centre for international banking (after United Kingdom and Japan), in 1998 it has been overtaken by the United States, France, Germany, and Switzerland.

Table 2.2 – Geographical Distribution of the World's Cross Border Assets
(vis-à-vis all sectors)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Austria	0.90%	0.93%	0.93%	0.91%	0.92%	0.95%	0.91%	0.80%	0.85%
Belgium	3.13%	3.18%	3.15%	3.18%	3.24%	3.22%	3.11%	2.82%	2.73%
Denmark	0.67%	0.67%	0.66%	0.83%	0.65%	0.65%	0.69%	0.67%	0.71%
Finland	0.18%	0.19%	0.18%	0.19%	0.18%	0.19%	0.23%	0.21%	0.19%
France	6.75%	6.61%	7.43%	8.11%	7.61%	7.73%	7.15%	7.15%	6.85%
Germany	6.03%	6.13%	5.91%	6.84%	6.59%	6.98%	7.17%	7.17%	8.60%
Ireland	0.17%	0.20%	0.27%	0.36%	0.40%	0.53%	0.78%	1.02%	1.28%
Italy	1.47%	1.72%	1.68%	2.29%	1.92%	2.01%	2.58%	2.20%	2.32%
Luxembourg	4.70%	5.00%	5.33%	4.91%	5.49%	5.25%	5.16%	4.59%	4.61%
Netherlands	2.76%	2.88%	2.79%	2.63%	2.46%	2.49%	2.45%	2.43%	2.90%
Norway	0.12%	0.14%	0.17%	0.10%	0.09%	0.07%	0.09%	0.09%	0.11%
Spain	0.62%	0.75%	1.10%	1.79%	1.55%	1.81%	1.56%	1.24%	1.32%
Sweden	0.55%	0.55%	0.51%	0.40%	0.35%	0.45%	0.54%	0.50%	0.53%
Switzerland	6.47%	6.33%	6.09%	5.50%	5.68%	5.42%	5.83%	5.87%	6.14%
United Kingdom	17.00%	15.72%	16.34%	16.12%	16.86%	16.73%	17.53%	18.86%	19.71%
Canada	0.85%	0.76%	0.76%	0.64%	0.78%	0.81%	0.97%	0.99%	0.95%
Japan	15.10%	15.08%	14.10%	14.09%	14.16%	15.09%	13.49%	13.48%	12.96%
United States	9.19%	9.39%	8.95%	8.32%	7.47%	7.44%	8.01%	8.75%	8.38%
Bahamas	2.94%	3.06%	2.71%	2.56%	2.73%	2.34%	2.40%	2.58%	2.43%
Bahrain	0.89%	0.80%	1.06%	0.86%	0.86%	0.74%	0.76%	0.76%	0.93%
Cayman Islands	6.54%	6.61%	6.49%	6.04%	6.15%	5.67%	5.75%	5.66%	5.57%
Hong Kong	7.37%	8.04%	8.14%	7.96%	8.64%	8.12%	7.31%	6.65%	5.18%
Singapore	5.52%	5.17%	5.11%	5.24%	5.10%	5.20%	5.34%	5.30%	4.52%
Other	0.07%	0.09%	0.12%	0.12%	0.12%	0.11%	0.18%	0.24%	0.23%

Source: BIS, *International Banking and Financial Market Developments*, Various Issues.

The centralisation within the developing world's major financial centres is very evident (Table 2.3). The growth of some banking centres and the decline of others have resulted in a major centralisation of assets in a few banking centres. In 1983, Hong Kong's cross border assets amounted to US$67.5 billion, then increased to US$655 billion in 1995 before declining to US$500 billion in 1998. The same pattern can be observed in Singapore where its banks' cross border assets amounted to around US$89.4 billions in 1985 and increased dramatically to US$437 billion in 1998. This dramatic increase consolidated the positions of Hong Kong and Singapore as the

leading banking centres for international banking in the developing world. This is reflected in the increasing share of total international banking activity of both these centres. In 1983, Singapore and Hong Kong's share amounted only to 30%. In 1998, more than 50% of cross border assets were concentrated in these two banking centres. If we take into account the Cayman Islands' share, this ratio increases to more than 80%. Hence, it could be safely stated that the Caribbean centres, Hong Kong and Singapore capture most of cross border assets in the developing world.

Table 2.3 – Distribution of Cross-Border Assets among Developing World's Major Financial Centres *(vis-à-vis all sectors)*

Major Banking Centres	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	1997	1998
Bahamas	17%	16%	14%	13%	13%	11%	11%	12%	11%	11%	12%	13%
Bahrain	6%	6%	5%	4%	3%	4%	4%	4%	3%	4%	4%	5%
Cayman Islands	25%	26%	28%	28%	28%	27%	27%	26%	26%	26%	27%	30%
Hong Kong	28%	29%	28%	32%	34%	34%	35%	37%	37%	34%	31%	27%
Singapore	23%	24%	24%	24%	22%	22%	23%	22%	23%	25%	25%	24%
Other	0%	0%	0%	0%	0%	1%	1%	1%	0%	1%	1%	1%
Share of the three leading banking centres	77%	79%	80%	84%	84%	84%	85%	85%	86%	85%	83%	81%

Source: BIS, *International Banking and Financial Market Developments*, Various Issues

Cross Border Deposit Activity

Similar to cross border assets, cross border liabilities (an indicator of cross border deposit taking activity) also show a high degree of centralisation. In 1998, around 70% of the developed world' cross border liabilities were concentrated in the major financial centres of the developed world. The supremacy of the United Kingdom is very evident. The United Kingdom alone captures more than 20% of the world's cross- border liabilities. Interesting to note is the declining share of Japan during the last decade. In 1987, Japan was the second biggest centre for cross border liabilities with a share of almost 15% of the world's cross border liabilities. In the 1990s, Japan's share of cross border liabilities declined dramatically and by 1998 its share stood only at 7.5%. Germany, on the other hand, has increased its share from 4% in

1990 to almost 10% in 1998, making it the third biggest centre for cross border liabilities after the United Kingdom and the United States. All in all, the table below shows that cross border liabilities in the developed world have become geographically more dispersed during the last decade. This is mainly the result of the declining importance of Japan. The importance of Hong Kong and Singapore is also evident where these two centres capture around 10% of world's cross border liabilities.

Table 2.4 – Geographical Distribution of the World's Cross-Border Liabilities
(vis-à-vis all sectors)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Austria	1.04%	1.09%	1.10%	1.06%	1.03%	1.08%	1.11%	0.99%	1.06%
Belgium	3.36%	3.26%	3.26%	3.17%	3.28%	3.48%	3.29%	2.99%	2.91%
Denmark	0.68%	0.65%	0.55%	0.41%	0.40%	0.41%	0.48%	0.55%	0.62%
Finland	0.66%	0.62%	0.46%	0.35%	0.28%	0.26%	0.20%	0.18%	0.18%
France	7.43%	7.77%	7.89%	7.88%	7.83%	7.83%	7.62%	7.19%	7.09%
Germany	3.47%	3.67%	4.30%	4.81%	5.76%	6.89%	7.04%	7.50%	9.57%
Ireland	0.27%	0.28%	0.31%	0.38%	0.40%	0.58%	0.79%	1.07%	1.38%
Italy	2.21%	3.57%	3.87%	3.44%	3.28%	2.95%	3.06%	2.71%	2.80%
Luxembourg	4.19%	4.37%	4.54%	4.71%	4.85%	4.88%	4.74%	4.15%	4.11%
Netherlands	2.29%	2.34%	2.50%	2.46%	2.35%	2.54%	2.69%	2.79%	3.51%
Norway	0.33%	0.24%	0.17%	0.14%	0.10%	0.10%	0.22%	0.25%	0.27%
Spain	0.99%	1.16%	1.34%	1.42%	1.44%	1.43%	1.58%	1.59%	1.99%
Sweden	1.54%	1.44%	1.00%	0.80%	0.71%	0.70%	0.70%	0.68%	0.92%
Switzerland	4.96%	4.94%	4.83%	4.58%	4.73%	4.68%	4.99%	5.03%	5.21%
United Kingdom	18.59%	17.35%	17.71%	18.04%	17.94%	18.41%	19.21%	20.10%	20.37%
Canada	1.25%	1.22%	1.18%	1.08%	1.15%	1.10%	1.22%	1.40%	1.26%
Japan	14.80%	13.17%	11.26%	10.98%	10.12%	9.43%	8.59%	7.99%	7.51%
United States	10.10%	10.21%	10.93%	11.42%	11.47%	11.11%	10.75%	11.51%	10.75%
Bahamas	3.18%	3.45%	3.01%	2.76%	2.84%	2.47%	2.54%	2.66%	2.47%
Bahrain	0.79%	0.71%	0.97%	0.83%	0.81%	0.71%	0.72%	0.71%	0.91%
Cayman Islands	6.29%	6.27%	6.34%	6.18%	6.01%	5.68%	5.72%	5.63%	5.53%
Hong Kong	6.22%	7.19%	7.37%	7.62%	8.14%	7.92%	7.16%	6.76%	4.74%
Singapore	5.31%	4.93%	4.99%	5.36%	4.99%	5.28%	5.45%	5.39%	4.69%
Other	0.05%	0.08%	0.10%	0.11%	0.08%	0.09%	0.13%	0.18%	0.16%

Source: BIS, *International Banking and Financial Market Developments*, Various Issues

The concentration of cross border liabilities in the major banking centres of the developing world is more acute. Around 80% of cross border liabilities concentrate in Hong Kong, Singapore and Cayman Islands. In this respect, it is important to notice the decline of Bahrain and the Bahamas as important centres for deposit taking.

During the last decade, their shares of cross border liabilities have declined considerably, especially the Bahamas where its share has declined from 18% in 1987 to 13% in 1998.

Table 2.5 – Distribution of Cross-Border Liabilities among Developing World's Major Financial Centres

Major Banking Centres	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Bahamas	18%	17%	15%	15%	15%	13%	12%	12%	11%	12%	12%	13%
Bahrain	6%	6%	5%	4%	3%	4%	4%	4%	3%	3%	3%	5%
Cayman Islands	26%	24%	28%	29%	28%	28%	27%	26%	26%	26%	26%	30%
Hong Kong	26%	28%	26%	28%	32%	32%	33%	36%	36%	33%	32%	26%
Singapore	24%	25%	25%	24%	22%	22%	23%	22%	24%	25%	25%	25%
Other	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Share of the three leading financial centres	76%	77%	80%	82%	81%	82%	84%	84%	85%	84%	83%	81%

Source: BIS, *International Banking and Financial Market Developments*, Various Issues

2.3.2 Foreign Exchange Market

The traditional players in the foreign exchange market are commercial banks, merchant banks and specialised brokers. These may act on the behalf of their customers such as importers, exporters, and MNC headquarters or trade on their own account. By minimising the exchange rate risk for their clients through hedging in the forward market or through swap contracts, the foreign exchange market can increase the scale of international trade and internationalisation of industrial and banking capital. During the last decade, the foreign exchange market has grown enormously. According to the BIS (1998), the total reported foreign exchange market turnover[3] adjusted for local double counting reached an unprecedented level of a daily average of US$ 1572 billion in April 1995. In 1998, this figure increased to US$ 1917 billion. These figures exceed by far the volume of international trade or aggregate world GDP. Given that the global foreign exchange turnover is much greater than the trading needs of banks' and dealers' customers such as importers and exporters, this

suggests that the bulk of turnover can be accounted for by banks and dealers trading on their own account[4] or the account of their customers for speculative or risk adjustment unconnected with their underlying real business.

An interesting feature of this market is the declining importance of spot transactions relative to outright forwards and foreign exchange swaps. In 1989, the turnover volume of spot transactions was larger than the turnover of outright forwards and foreign exchange swaps. In 1992, this was no longer the case and the turnovers of both categories were almost equal. In 1995 and 1998, forward instruments consolidated their leading position, pushing the share of spot turnover down to 44% in 1995 and 40% in 1998 (BIS 1998). Within the former group, foreign exchange swaps continued to be the dominant instrument, overshadowing outright forwards by a large margin (BIS 1998).

Another important feature of this market, highly relevant for this discussion, is its high degree of geographical concentration. In 1995, the three major international financial centres (United Kingdom, United States, and Japan) accounted for about 56% of total foreign exchange market turnover (Table 2.6). Of these, the UK is the most important centre for foreign exchange trading, constituting alone around 30% of global turnover. In 1998, these three centres increased their share to 58%. However, note that this larger share was mainly due to the higher shares of United Kingdom and United States. Japan's share, on the other hand, has declined from 10% in 1995 to 8% in 1998. The high degree of geographical centralisation becomes more evident if other centres are taken into account. In 1998, 82% of the global foreign exchange market

[3] Data include spot, outright forwards, and foreign exchange swaps activity.

activity was concentrated in 8 countries (United Kingdom, United States, Japan, Hong Kong, Singapore, Switzerland, Germany, and France).

Table 2.6 – Geographical Distribution of Global Traditional Foreign Exchange Market Activity[1] *(average daily turnover in billion of US dollars)*

	1992		1995		1998	
Country	Amount	*Share*	Amount	*Share*	Amount	*Share*
Australia	28.9	*4*	29.0	*3*	46.6	*2*
Austria	4.4	*0*	13.3	*1*	10.5	*1*
Bahrain	3.5	*0*	3.1	*0*	2.4	*0*
Belgium	15.7	*1*	28.1	*2*	26.5	*1*
Canada	21.9	*2*	29.8	*2*	36.8	*2*
Denmark	26.6	*2*	30.5	*2*	27.3	*1*
Finland	6.8	*1*	5.3	*0*	4.2	*0*
France	33.3	*3*	58.0	*4*	71.9	*4*
Germany	55.0	*5*	76.2	*5*	94.3	*5*
Greece	1.1	*0*	3.3	*0*	7.2	*0*
Hong Kong	60.3	*6*	90.2	*6*	78.6	*4*
Ireland	5.9	*1*	4.9	*0*	10.1	*1*
Italy	15.5	*1*	23.2	*1*	28.2	*1*
Japan	120.2	*11*	161.3	*10*	148.6	*8*
Luxembourg	13.2	*1*	19.1	*1*	22.2	*1*
Netherlands	19.6	*2*	25.5	*2*	41.0	*2*
New Zealand	4.2	*0*	7.1	*0*	6.9	*0*
Norway	5.2	*0*	7.6	*0*	8.8	*0*
Portugal	1.3	*0*	2.4	*0*	4.4	*0*
Singapore	73.6	*7*	105.4	*7*	139.0	*7*
South Africa	3.4	*0*	5.0	*0*	8.8	*0*
Spain	12.3	*1*	18.3	*1*	19.3	*1*
Sweden	21.3	*2*	19.9	*1*	15.4	*1*
Switzerland	65.6	*6*	86.5	*6*	81.7	*4*
United Kingdom	290.5	*27*	463.8	*30*	637.3	*32*
United States	166.9	*16*	244.4	*16*	350.9	*18*
Total reported turnover net of local double counting ("net gross")[2]	*1076.2*		*1571.8*		*1917.0*	

Notes:

(1) Data include spot transactions, outright forward, and foreign exchange swaps. The survey was performed in April of each year.

(2) Data are adjusted for local-double counting. Adjustment have in principle been made by halving positions vis-à-vis other local reporting local dealers and other reporting dealers abroad respectively.

Source: BIS (1998) " Central Bank Survey of Foreign Exchange and Derivatives Market Activity in April 1998: Preliminary Global Data", BIS Press Release.

[4] It is important to note that interbank activity (as banks lay off their own OTC risks) constitutes a siginifcant part of total turnover.

2.3.3 *The Derivatives Markets*

The Derivatives markets are an integral part of the modern credit system. In these markets, traders and investors are able to hedge against different types of price risk such as interest rate risk, foreign exchange risk, the risk of movement in prices of raw materials, metals or agricultural commodities. The increasing volatility in the world financial markets has contributed greatly to the growth of derivatives markets. According to the BIS (1998), the average daily turnover of OTC derivative market activity amounted to US$ 474 billion in 1998.[5] Note that this figure does not include data on outright forward and foreign exchange swaps which were included in the foreign exchange turnover figures. In particular, data only include OTC derivative activity for two main categories: Foreign exchange derivative instruments (currency swaps and options) and single-currency interest rate derivative instruments (forward rate agreements, swaps, and options such as options on traded securities, interest rate options, interest rate cap, interest rate floor, etc). The latter category outweighs the former one accounting for almost 70% of total turnover. In the foreign exchange derivative category, options are the dominant instrument, while in the interest rate derivative activity, swaps consolidated their leading position. In fact, interest rate swaps account for almost 43% of the global turnover in OTC derivative instruments, followed by currency options (24%) and forward rate agreements (21%).

One important feature of the derivative market is its high degree of concentration in very few financial centres. In 1998, 55% of global OTC derivative market activity took place in the United Kingdom and the United States, with the United Kingdom alone capturing 36% of the total market activity (Table 2.7). The high degree of

[5] This figure is adjusted for local double counting.

centralisation becomes more evident if we take other leading centres into account. In 1998, more than 80% of total OTC derivative activity was concentrated in the United Kingdom, United States, France, Japan, and Germany. It is interesting to note the decline of some leading banking centres' share such as Singapore (from 7% in 1995 to 2% in 1998) and the rise in other centre's share such as the UK which increased its share from 27% in 1995 to 36% in 1998.

Table 2.7 – Geographical Distribution of Global over-the-counter Derivative Market Activity[1] (average daily turnover in billions of US dollars)

	1995		1998	
Country	*Amounts*	*Percentage Share*	*Amounts*	*Percentage Share*
Australia	3.8	*1*	4.6	*1*
Austria	2.3	*1*	4.6	*1*
Bahrain	4.1	*2*	0.4	*0*
Belgium	6.2	*2*	5.7	*1*
Canada	5.3	*2*	7.5	*2*
Denmark	3.9	*1*	4.9	*1*
Finland	1.8	*1*	2.4	*0*
France	22.3	*8*	45.8	*10*
Germany	13.8	*5*	34.4	*7*
Greece	0.1	*0*	0	*0*
Hong Kong	4.3	*2*	3.8	*1*
Ireland	1.5	*1*	2.4	*1*
Italy	2.4	*1*	4.4	*1*
Japan	32.8	*12*	42.1	*9*
Luxembourg	2.2	*1*	2.6	*1*
Netherlands	5.2	*2*	5.3	*1*
New Zealand	0.2	*0*	0.5	*0*
Norway	1.5	*1*	2.9	*1*
Portugal	0.1	*0*	1	*0*
Singapore	18.1	*7*	11.3	*2*
South Africa	0.4	*0*	0.8	*0*
Spain	3.6	*1*	3.5	*1*
Sweden	2.3	*1*	4.3	*1*
Switzerland	4.4	*2*	15.8	*3*
United Kingdom	73.8	*27*	170.8	*36*
United States	53.2	*20*	90.9	*19*
Total "net-gross" turnover[2]	**269.5**		**474**	

(1) Data include Foreign Exchange Contracts (Currency swaps, Options, Other) and Interest Rate Derivative instruments (FRAs, Swaps, Options, Other). The Figures exclude outright forwards and foreign exchange swaps. Turnover is defined as the absolute gross value of all deals concluded (but not closed) during the month and was measured in terms of the notional amounts of contracts.

(2) Data are adjusted for local double counting.

Source: BIS (1998) " Central Bank Survey of Foreign Exchange and Derivatives Market Activity in April 1998: Preliminary Global Data", BIS Press Release

Futures and options on traded exchanges

As in the case of OTC derivative activity, futures and options traded on organised exchanges show a high degree of centralisation. Tables 2.8 and 2.9 provide figures on the turnover in notional amounts of equity index, currency and interest rate futures and options and the shares of North America, Europe and Asia out of total activity. Table 2.8 below shows that interest rate futures and interest rate options are by far the most dominant instruments constituting the bulk of trade activity. Also interesting to note is the geographical concentration of trading activity in Europe and North America. More than 80% of futures are traded in these two regions. In the case of options, the degree of concentration is much higher with 94% of the activity taking place in these two parts of the world.

Table 2.8 – Turnover of Futures Traded on Organised Exchanges by Instrument and Location *(notional principal in billion of US dollars)*

	1996		1997		1998	
	Amount	*Share*	Amount	*Share*	Amount	*Share*
FUTURES (All markets)	**269474.8**	***100%***	**294423.4**	***100%***	**318611.1**	***100%***
Interest rate	253526.5	*94%*	274594.2	*93%*	294792.6	*93%*
Currency	2999.4	*1%*	3466.1	*1%*	3068.4	*1%*
Equity index	12948.9	*5%*	16363.1	*6%*	20750.1	*7%*
LOCATION						
North America	**119946.9**	***45%***	**139115.3**	***47%***	**151928**	***48%***
Interest rate	110311		127188		139326	
Currency	2504.5		3029.3		2868.7	
Equity index	7131.4		8897.9		9733.3	
Europe	**86395.9**	***32%***	**100225.8**	***34%***	**117396.1**	***37%***
Interest rate	83678.8		95845.7		109134.5	
Currency	5.8		6		10.2	
Equity index	2711.4		4374		8251.5	
Asia	**59867.1**	***22%***	**52429.1**	***18%***	**47285.6**	***15%***
Interest rate	57056.4		49840.2		44797.1	
Currency	37.3		26.8		3.8	
Equity index	2773.3		2562.1		2484.7	
Other markets	3264.9	*1%*	2653.2	*1%*	2001.2	*1%*
Interest rate	2480.3		1720.2		1534.9	
Currency	451.7		403.9		185.7	
Equity index	332.8		529		280.5	

Source: BIS, *International Banking and Financial Market Developments*, (Various Issues).

Table 2.9 – Turnover of Options Traded on Organised Exchanges by Instrument and Location *(notional principal in billion of US dollars)*

	1996		1997		1998	
	Amount	Share	Amount	Share	Amount	Share
OPTIONS (All markets)	52053.5	100%	62326.3	100%	69088.1	100%
Interest rate	41016.5	79%	48601.3	78%	55480.4	80%
Currency	905.5	2%	685.3	1%	397.8	1%
Equity index	10131.5	19%	13039.7	21%	13209.9	19%
North America	34254.4	66%	43579.9	70%	47605.5	69%
Interest rate	26012.1		33763.3		38599.1	
Currency	843.5		636.8		379.5	
Equity index	7398.9		9179.8		8626.9	
Europe	**13731.5**	**26%**	**14706**	**24%**	**17225.5**	**25%**
Interest rate	11998.3		11855.7		14152.4	
Currency	17.3		6.3		0.9	
Equity index	1716		2843.9		3072.2	
Asia	**3901.9**	**7%**	**3840.3**	**6%**	**3998.5**	**6%**
Interest rate	2968.5		2932.7		2590.9	
Currency	0		0		0	
Equity index	933.5		907.7		1407.7	
Other markets	**165.6**	**0%**	**200.2**	**0%**	**258.5**	**1%**
Interest rate	37.6		49.7		138	
Currency	44.8		42.2		17.4	
Equity index	83.2		108.2		103.1	

Source: BIS (1998), Source: BIS, *International Banking and Financial Market Developments*, August.

Data on market activity within regions are not available for all instruments. In order to get an idea of the extent of centralisation within regions, Table 2.10 below provides evidence on the location of equity index futures and options in 1998. As the table below shows, in North America, almost all equity index options are traded on the Chicago Board Options Exchange (CBOE) and the Chicago Mercantile Exchange (CME). In the case of equity index futures, almost all of the trading activity takes place in the CME.[6]

[6] It is noteworthy that the CME and CBOT dominate organised derivative markets accounting for almost 50% of turnover.

Table 2.10- Geographical Distribution of Equity Index Options and Futures

Exchanges	Equity Index Options	Equity Index Options	Equity Index Futures	Equity Index Futures
	Volume	Notional Value	Volume	Notional Value
	(n° of contracts)	*(million USD)*	*(n° of contracts)*	*(million USD)*
AMEX (USA)	779,281	44,057.3	Not Traded	Not Traded
AMEX (USA) Hong Kong	114,785	2,122.0	Not Traded	Not Traded
AMEX (USA) Japan	440,427	6,972.0	Not Traded	Not Traded
AMEX (USA) Pan-European	51,503	1,357.5	Not Traded	Not Traded
CBOE (USA)	67,209,060	4,847,366.9	Not Traded	Not Traded
CBOE (USA) Japan	4,569	106.4	Not Traded	Not Traded
CBOE (USA) Mexico	16,150	156.9	Not Traded	Not Traded
CBOT (USA)	245,398	21,179.8	3,567,512	307,904.8
CME (USA)	5,139,403	1,371,883.7	37,546,557	9,022,487.8
CME (USA) Japan	7,725	593.1	479,248	36,796.7
KCBT (USA)	1,662	149.1	80,830	7,852.8
NYCE/NYFE (USA)	93,343	25,699.7	590,327	162,531.8
Toronto SE (Canada)	388,273	9,707.9	457,751	57,477.4
Europe				
AEX (Netherlands)	7,951,338	445,319.5	3,498,970	390,415.4
AEX (Netherlands) Pan-European	36,106	1,068.7	2,026	119.9
BELFOX (Belgium)	978,341	6,834.8	664,360	46,410.1
EUREX Deutschland (Germany)	29,948,503	844,309.9	6,995,152	978,187.2
EUREX Deutschland (Germany) Pan European	196,730	6,812.6	461,206	15,937.3
EUREX Zurich (Switzerland)	3,394,098	166,099.1	4,445,396	217,547.2
HEX (Finland)	267,959	4,246.6	236,220	3,743.6
FUTOP (Denmark)	4,073	134.3	289,424	9,545.1
IDEM (Italy)	1,616,635	299,041.6	5,926,310	1,092,529.3
LIFFE (UK)	4,541,456	423,675.7	7,020,315	1,627,689.9
LIFFE (UK) Pan-European	Not Traded	Not Traded	42,058	2,489.7
MATIF (France)	Not Traded	Not Traded	16,908,364	1,059,654.0
MEFF Variable (Spain)	1,681,205	174,570.0	1,681,205	174,570.0
MONEP (France)	7,981,570	445,553.7	Not Traded	Not Traded
OM (Sweden)	4,947,486	68,990.9	9,265,510	80,716.6
Oslo (Norway)	828,445	6,803.4	354,602	2,912.1
Asia				
HKFE (Hong Kong)	805,357	48,665.2	7,155,543	425,477.3
HKFE (Hong Kong) Taiwan	56	8.2	71	2.1
Osaka (Japan)	5,232,623	614,291.3	9,722,134	80,715.2
SFE (Australia)	847,375	34,986.7	3,678,151	151,864.9
SIMEX (Singapore)	NT	NT	27,727	606.3
SIMEX (Singapore) Hong Kong	NT	NT	6,124	221.9
SIMEX (Singapore) Japan	838,891	49,262.0	5,632,813	326,878.9
SIMEX (Singapore) Taiwan	20,521	629.2	1,842,977	56,507.5
SIMEX (Singapore) Thailand	NT	NT	721	10.9
Tokyo (Japan)	330	29.7	2,731,212	246,091.1

Source: FBIV

In Europe, the dominance of Germany is quite evident, especially in equity index futures. More than a third of total trading in equity index futures in Europe takes place in Germany. United Kingdom, France, Switzerland and Netherlands also have active exchanges. In case of Asia and the Pacific, Japan's supremacy is dominant, followed by Hong Kong and Singapore.

The data also show a high degree of geographical concentration of activity in a few established centres. For instance, if we consider the case of equity index options we find that in 1998, more than 80% of equity index option turnover was concentrated in the CBOE and CME. The shares of Japan (6%), France (6%), Germany (6%) and the UK (5%) remain modest compared to the share of the American exchanges. A similar pattern can be observed in the case of equity index futures. All in all, the evidence suggests that almost 90% of total trading in equity index futures and options is concentrated in the major financial centres of the developed world.[7]

2.3.4 The Stock Market

Tables 2.11 and 2.12 reveal some interesting observations regarding the world's major stock markets. First, as table 2.11 shows, despite the growing importance of emerging markets in recent years, the bulk of equity turnover is concentrated in the major financial centres of the developed world. In 1998, only 8.55% percent of world' market value of shares traded was concentrated in emerging markets. While the crisis in East Asia has played a role, the steady decline in recent years may suggest that other factors have been at work. Second, as Table 2.12 shows, the value of shares traded on the American exchanges is enormous in comparison with any other country.

During the 1990s, the US has consolidated its leading position in terms of market value of shared traded which increased from US$1.75 billion in 1990 to more than US$13 billion in 1998. While in 1990, the US accounted only for 38% of the market value of shared traded in the developed markets, by 1998, this share increased to 63% (Table 2.12). On the other hand, during the same period, the turnover on the Japanese stock exchanges declined dramatically. While in 1990, the US and Japan had equal market value of shares traded, in 1998 the market value of equity turnover in the US was 13 times higher than that of Japan. The European stock exchanges also lag well behind the US in terms of market value of shares traded. In 1998, the leading financial centres of Europe (Germany, UK and France) accounted only for 15% of the market value of shares traded in developed markets. As to Hong Kong and Singapore, their shares of equity turnover are negligible. Third, as in the case of other financial activities, stock market turnover shows a high degree of centralisation in a few financial centres. The data show that more than 75% of equity turnover is concentrated in the leading financial centres of the developed world (US, Germany, UK, Japan and France).

Table 2.11 – Stock Value Traded in Developed and Emerging Markets

	1990	1991	1992	1993	1994	1995	1996	1997	1998
World Value Traded	**5514706**	**5019596**	**4782850**	**7194675**	**8821845**	**10218748**	**13616070**	**19484814**	**22874320**
Developed Market	4614786	4403631	4151662	6090929	7156704	9176451	12105541	16818167	20917462
Emerging Markets	899920	615965	631188	1103746	1665141	1042297	1510529	2666647	1956858
Share of emerging market's value traded out of world value traded	16.319%	12.271%	13.197%	15.341%	18.875%	10.200%	11.094%	13.686%	8.555%

[7] It is important to note that this evidence refers only to one type of futures and options trading and hence it can only give us a good indication of the extent of centralisation of derivatives traded on

Table 2.12 – Concentration of Value of Shares Traded in Developed Markets

Developed Markets	1990	1991	1992	1993	1994	1995	1996	1997	1998
Australia	0.87%	1.06%	1.10%	1.11%	1.32%	1.08%	1.96%	1.85%	1.95%
Austria	0.40%	0.16%	0.12%	0.11%	0.23%	0.28%	0.17%	0.15%	0.08%
Belgium	0.14%	0.14%	0.19%	0.18%	0.18%	0.17%	0.22%	0.18%	0.26%
Canada	1.54%	1.77%	2.01%	2.33%	2.25%	2.00%	2.19%	2.11%	1.78%
Denmark	0.24%	0.21%	0.38%	0.34%	0.38%	0.28%	0.29%	0.28%	0.00%
Finland	0.09%	0.04%	0.06%	0.13%	0.18%	0.21%	0.19%	0.22%	0.29%
France	2.53%	2.58%	2.93%	2.86%	4.30%	3.97%	2.29%	2.41%	2.74%
Germany	10.87%	8.62%	10.74%	4.97%	6.44%	6.25%	6.35%	6.12%	6.65%
Italy	0.92%	0.57%	0.68%	1.08%	1.65%	0.95%	0.85%	1.18%	2.27%
Japan	34.72%	22.62%	15.30%	15.67%	15.67%	13.42%	10.34%	7.44%	4.53%
Luxembourg	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.01%
Netherlands	0.87%	0.88%	1.10%	1.10%	2.38%	2.71%	2.80%	1.69%	1.81%
New Zealand	0.04%	0.07%	0.08%	0.11%	0.10%	0.09%	0.07%	0.15%	0.24%
Norway	0.30%	0.26%	0.24%	0.14%	0.12%	0.27%	0.30%	0.28%	0.20%
Spain	0.89%	0.92%	0.96%	0.77%	0.86%	0.65%	2.07%	2.69%	3.34%
Sweden	0.38%	0.49%	0.68%	0.72%	1.19%	1.02%	1.13%	1.05%	0.97%
UK	6.04%	7.16%	9.23%	6.95%	6.48%	5.56%	4.78%	4.93%	5.58%
US	37.95%	49.59%	50.14%	55.08%	49.80%	55.67%	58.83%	60.74%	62.86%
Hong Kong	0.75%	0.88%	1.82%	2.16%	2.06%	1.16%	1.37%	2.91%	0.98%
Singapore	0.44%	0.41%	0.34%	1.34%	1.13%	0.66%	0.35%	0.38%	0.24%
Other	0.00%	1.56%	1.90%	2.80%	3.26%	3.61%	3.45%	3.24%	3.20%

Source: IFC, Emerging Stock Markets Factbook 1999

In order to provide an indication of the international dimension of different centres, Table 2.13 examines the relevance of foreign companies and securities for the stock exchange in various cities.[8] As can be seen, Luxembourg, Frankfurt, Switzerland and Brussels exchanges have very high ratios of listed foreign companies to total listings. A more accurate indicator of the relevance of foreign activity however is the value of share trading in foreign companies to total value of share trading which is presented in column 2. Based on this measure, it is clear that London is the most international among centres with turnover in foreign shares constituting almost 60% of total turnover, followed at a distance by Brussels (13.5%) and Stockholm (10%).

organised exchanges.

Table 2.13 –Importance of Foreign Companies on the Stock Exchange

(end of 1997)

Exchange	Foreign companies listed	Value of share trading in foreign companies
North America	*% of total listing*	*% of total value share trading*
Montreal	*2%*	0.33%
NASDAQ	*8%*	13.73%
NYSE	*14%*	8.39%
Europe		
Amsterdam	*43%*	0.35%
Athens	*0%*	0.00%
Barcelona	*1%*	0.03%
Bilbao	*0%*	0.00%
Brussels	*48%*	13.44%
Copenhagen	*5%*	2.71%
Germany	*74%*	4.49%
Helsinki	*2%*	0.21%
Irish	*19%*	0.00%
Istanbul	*0%*	0.06%
Italy *	*2%*	0.07%
Lisbon	*0%*	0.00%
London	*19%*	58.12%
Luxembourg	*80%*	1.79%
Madrid	*1%*	0.03%
Oslo	*10%*	3.52%
Paris	*20%*	2.47%
Stockholm	*6%*	9.91%
Switzerland	*50%*	4.98%
Vienna	*27%*	2.44%
Warsaw	*0%*	0.00%
Asia and Pacific		
Australian	*5%*	0.73%
Hong Kong	*3%*	0.07%
Kuala Lumpur	*0%*	0.25%
New Zealand	*29%*	4.54%
Osaka	*0%*	0.05%
Philippine	*0%*	0.00%
Singapore	*12%*	0.00%
Taiwan	*0%*	0.00%
Thailand	*0%*	0.00%
Tokyo	*3%*	0.16%

Source: FIBV

[8] Data at the country level are not available.

Table 2.14 shows individual stock markets' capitalisation as a proportion of developed markets' total stock market capitalisation.[9] In 1998, the US consolidated itself as the biggest stock exchange in the world, followed by a wide margin by Japan and the UK. Notice the rapid decline in the importance of Japan. As recently as 1989, Japan was the biggest centre in the world with a share of 37.5% of world's stock market capitalisation. In 1998, this share stood only at 9%. In Europe, the UK has the biggest stock exchange followed by Germany, France, the Netherlands and Italy. All in all, the leading financial centres of the developed world account for around 80% of world total market capitalisation in 1998.

Table 2.14 – Major Stock Markets' Capitalisation as a Proportion of Developed Markets' Stock Market Capitalisation

Developed Markets	1990	1991	1992	1993	1994	1995	1996	1997	1998
Australia	1.22%	1.39%	1.37%	1.65%	1.66%	1.55%	2.73%	3.27%	3.42%
Austria	0.13%	0.07%	0.22%	0.23%	0.23%	0.21%	0.19%	0.17%	0.13%
Belgium	0.75%	0.68%	0.65%	0.63%	0.64%	0.66%	0.66%	0.64%	0.96%
Canada	2.75%	2.56%	2.45%	2.65%	2.38%	2.31%	2.68%	2.66%	2.13%
Denmark	0.44%	0.43%	0.33%	0.34%	0.41%	0.35%	0.40%	0.44%	0.39%
Finland	0.26%	0.14%	0.12%	0.19%	0.29%	0.28%	0.35%	0.34%	0.60%
France	3.58%	3.34%	3.54%	3.70%	3.42%	3.29%	3.26%	3.16%	3.88%
Germany	4.04%	3.77%	3.51%	3.76%	3.56%	3.64%	3.70%	3.87%	4.28%
Italy	1.69%	1.52%	1.22%	1.10%	1.36%	1.32%	1.42%	1.62%	2.23%
Japan	33.21%	30.01%	23.57%	24.33%	28.16%	23.12%	17.03%	10.40%	9.77%
Luxembourg	0.12%	0.11%	0.12%	0.16%	0.22%	0.19%	0.18%	0.16%	0.14%
Netherlands	1.36%	1.30%	1.36%	1.48%	2.14%	2.25%	2.09%	2.20%	2.36%
New Zealand	0.10%	0.14%	0.15%	0.21%	0.21%	0.20%	0.21%	0.42%	0.35%
Norway	0.30%	0.21%	0.18%	0.22%	0.28%	0.28%	0.32%	0.31%	0.22%
Spain	1.27%	1.42%	1.00%	0.97%	1.17%	1.25%	1.34%	1.36%	1.57%
Sweden	1.11%	0.97%	0.79%	0.87%	0.99%	1.12%	1.36%	1.28%	1.09%
UK	9.66%	9.47%	9.34%	9.34%	9.16%	8.88%	9.59%	9.36%	9.29%
US	34.83%	39.18%	45.20%	41.67%	38.36%	43.24%	46.77%	53.05%	52.64%
Hong Kong	0.95%	1.17%	1.73%	3.13%	2.04%	1.92%	2.48%	1.94%	1.34%
Singapore	0.39%	0.46%	0.49%	1.08%	1.02%	0.93%	0.83%	0.50%	0.37%
Other	1.82%	1.68%	2.66%	2.29%	2.31%	3.01%	2.42%	2.84%	2.83%

Source: IFC, Emerging Stock Markets Factbook 1999

[9] We focus here on developed markets only which represent the bulk of world's market capitalisation. For instance, in 1998 the market capitalisation of emerging markets represented only 7% of world

2.3.5 The Bond Market

Many problems arise when it comes to providing data on bond market activity. The FIBV provides data on bond turnover data, but such data do not include over-the-counter trade in these bonds. This limits the usefulness of comparisons across centres, especially since the bulk of this trade occurs over-the-counter. This can explain the low value of trade in bonds in Table 2.15. However, it is possible to make some comparisons in terms of the market value of bonds listed and the total number of bond issuers. As the table below shows, the market value of bonds listed is highest in New York in 1997.[10] In Europe, Frankfurt has the highest market value of bonds listed, followed by Luxembourg, Italy, London and Paris. In Asia and the Pacific, the supremacy of the Japanese exchanges is evident. In terms of foreign bonds listed, Luxembourg is the most important centre followed by a wide margin by London, Germany, Paris and Switzerland.

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market capitalisation decreasing from 13% in 1994.

[10] In terms of corporate bonds, the American exchanges are the most important in the world.

Table 2.15 – Turnover, market capitalisation, and number of bonds listed in Bond markets *(end of 1997)*

Exchange	Market value of bond listed (at year end, 1997)	Value of bond trading	Total number of bond issuers	Foreign bonds listed
North America				
Montreal (TSV) *	185,472.7	35.0	26	3
NYSE (TSV) *	2,625,357.0	5,063.3	1,965	211
Europe				
Amsterdam (REV)	334,786.4	281,242.3	866	191
Barcelona (REV)	13,051.2	33,505.3	266	13
Brussels (TSV)	210,811.2	557.0	130	2
Copenhagen (REV)	291,643.5	1,073,363.6	2,464	8
Germany (REV)	2,021,783.0	1,509,913.2	24,129	1,075
Helsinki (TSV)	47,235.2	93.6	308	0
Italy (REV) *	1,069,368.0	6,144,138.3	761	13
London (REV)	978,000.2	NA	9,075	4,074
Luxembourg (TSV)	1,787,454.2	7,375.4	9,574	9,294
Madrid (TSV)	22,092.7	27,427.9	967	202
Paris (REV)	777,524.4	12,141,595.0	3,469	1,349
Stockholm (REV)	201,018.3	1,792,075.3	987	15
Switzerland (REV)	243,411.5	132,168.9	1,906	761
Asia and the Pacific				
Australian (TSV) *	76,107.6	106.0	1,244	-
Hong Kong (TSV)	NA	23.2	286	251
Korea (TSV)	132,222.2	4,102.6	15,887	3
Osaka (TSV)	1,785,308.4	17,592.2	888	7
Singapore (TSV)	171,625.9	3,883.4	89	NA
Taiwan (TSV)	32,919.1	683.00	93	7
Thailand (TSV)	351.0	0.03	16	0
Tokyo (TSV) *	1,814,982.4	138,031.2	1,136	52

Source: FIBV

2.3.6 International Payment Clearing Activity

At the heart of a financial centre's network is the international payment clearing system. One of the main functions of international financial centres is the clearing of international payments (Reed, 1989) . This activity is a condition for the expansion of foreign trade since it facilitates payment settlements and minimises transaction costs and different types of risk (such as settlement risk and credit risk) among receiving and paying banks. In the international context the importance of clearing system is very clear (Kingman-Brundage et al, 1986). Banks usually take the responsibility for the settlement of payments between traders for a fee. This settlement process involves

a number of complex steps as well as heavy investment in technology which few cities are likely to afford. Moreover, payments settlement requires an efficient financial structure and prudent monetary management. Because of the existence of economies of scale and the ability to minimise transaction costs (Kindleberger, 1974), these clearing activities are likely to be concentrated in very few financial centres. These financial centres are the hosts of large banks and clearing houses which take the responsibility for international payments clearing. Moreover, the existence of a large number of banks of different nationalities in a financial centre makes the settlement of international payments much easier. In fact, most of the international clearing activity occurs in New York through CHIPS (BIS, 1996). Available data indicate that in 1991, 37.6 million transactions were handled through CHIPS. In 1995, these transactions increased to 52 millions the value of which amounted to more than US$ 310 billion (BIS, 1996).

2.3.7 Centralisation of International Financial Activity: A Stylised Fact

It has not been possible to provide evidence on the extent of centralisation of each type of financial activity. However, the above evidence clearly suggests that financial activity is highly centralised in a few geographical locations. In order to establish this stylised fact, I focus on the share of the five international financial centres of the developed world (United Kingdom, United States, Japan, Germany and France) and the two leading financial centres of the developing world (Hong Kong and Singapore). In terms of cross border assets and cross border liabilities, around 66% of these assets and liabilities were concentrated in these centres in the end of 1998. The geographical concentration of foreign exchange activity is much higher with around 80% of global market turnover being concentrated in these centres in 1998. In terms

of over the counter derivative activity, the geographical concentration is even higher with 84% of total trading activity taking place in these centres in 1998. Although comprehensive data on futures and options traded are not available for each country, the data on equity index futures and options suggest that the bulk (around 90%) of this activity is concentrated in the major international financial centres. In terms of stock market turnover, the data show that more than 75% of equity turnover is concentrated in the leading financial centres of the developed world (US, Germany, UK, Japan and France). Furthermore, the leading financial centres of the developed world account for around 80% of world stock market capitalisation in 1998. Due to data unavailability, it is not possible to provide a comprehensive measure of concentration of bond market turnover. But the existing evidence shows that this activity also tend to be centralised in the leading centres of the world. Based on the empirical evidence, we can safely conclude that the high degree of geographical centralisation of international financial activity should be considered as a stylised fact.

2.4 World's Major Financial Centres

2.4.1 Differentiation Between International Financial Centres and Banking Centres

It is clear from the empirical evidence that financial activities performed in financial centres and the complexity of their financial structure differ substantially. In this thesis, we make a distinction between international financial centres (IFCs) and banking centres (BCs) based on the variety of functions performed in each of these centres, the complexity of their financial structure and the size of their markets. While banking centres perform a narrow range of functions mainly related to lending activity, international financial centres engage in the provision of a wide variety of financial services (international payment clearing, management of a global portfolio,

advisory services, liquidity and risk management, etc) and financial instruments (options, futures, swaps, bonds, stock etc). The provision of such a wide variety of services requires a complex network of financial markets. Hence, in order for a centre to qualify as an international financial centre, it must posses a very well developed financial structure. By a " well developed financial structure", it is meant that a centre must not only have an active banking system, but should also comprise a diversified set of active and liquid financial markets and provide a wide variety of financial instruments.

The level of complexity of financial markets differentiates international financial centres from banking centres which usually engage in the provision of a couple of financial services, mainly lending in the interbank market and trading in foreign exchange. [11] Because they provide fewer services, these banking centres do not require a complex financial structure and as such their financial systems are not characterised usually by well developed capital markets, but rather by an active banking system. In fact, a well-developed banking system with international banking expertise and a well-established communication infrastructure are sufficient for a banking centre to perform its functions efficiently.

The difference in the financial structure of financial centres also reflects their different roles and importance in the world economy allowing for another useful distinction based on the role played by each type of financial centre in the world economy. Banking centres' relatively simple financial structure reflects the role they assume in

[11] One very serious limitation to the theoretical classification above is that during the last two decades many banking centres have successfully managed to diversify their financial activities, activate their capital markets and establish new markets and financial products. In such cases, the distinction bewteen banking centres and international financial centres is unclear.

the world economy. This role is mainly to provide links between the centre's regional economies and the major international financial centres (Hodjera, 1978). Banking centres played an important role in transferring funds from regional economies endowed with a surplus to international financial centres which recycled these funds to economies in deficit and/or are more able to use these surplus funds. The outward intermediation function of these centres evolved rapidly and from the early seventies onward, some of these centres played an important role in the development of their regional economies by channelling funds from outside the region, mainly from the major international financial centres. These funds were used to finance regional trade as well as few public and private projects in the host and neighbouring economies (Bhattacharya, 1988). The interconnectedness between banking centres and the international financial centres may suggest that these centres form some type of a network which is responsible for extending the flow of capital to almost every region in the world with the major international financial centres acting as the fuel (being net suppliers of capital), engine, and organisers of this network. Through this network, flows of financial capital are directed from regions with low rates of return towards those regions with the highest rate of return and hence improving the efficiency of investment at a global level and at the same reinforcing the uneven geographical flows of financial capital.[12] [13]

[12] Furthermore, this network enables banks to achieve higher rates of return on their capital by avoiding taxes and restrictive regulatory environments.

[13] Because of the high interconnectedness between these centres, some economists suggest that banking centres should be treated as extensions to the international financial centres in the developed world (Gorostiaga, 1984) or as McCarthy (1979) puts it "offshore centres (i.e. banking centres) should be seen as adjuncts to these traditional centres rather than as solely competitors". However, the differentiation between financial centres on the basis of their role or importance in the world economy is highly abstract. Hence, in this paper, the criterion adopted to differentiate between different types of financial centres is the level of complexity of the financial structure of financial centres which is supposed to reflect indirectly their role and importance in the world economy.

The focus so far has been on "functional centres". But another type of financial centre, the "paper" centre also coexists with functional centres. Paper centres do not engage in providing funds for borrowers or any trading activity, but are rather used by banks as a location to record financial transactions that are undertaken somewhere else (McCarthy, 1979). In such centres, the sources and uses of funds are usually from outside the region and the value added from the booking of financial services is almost negligible (Park, 1982, 1989). These paper centres are sometimes also referred to in the literature as offshore banking centres. This term is used in the literature to indicate those cities or microstates that have engaged in deliberate actions to attract foreign businesses (McCarthy 1979). This definition is based on the observation that most of these centres offer monetary and fiscal incentives to encourage multinational banks (MNBs) to establish branches or subsidiaries on their jurisdiction. These incentives come in the form of low taxes, free movement of capital in and outside the country, easy entry for international banks, absence of reserve requirements on offshore deposits and very little regulation by domestic governments.[14] However, the classification of centres based only on their regulatory and tax incentive structure is difficult since all types of financial centres (from London to the Bahamas) have engaged in deliberate policies to attract financial activity to their jurisdiction. Our criterion of financial complexity can incorporate these centres better. Since these centres do not engage in the actual provision of financial activity, they do not require developed financial markets or even a developed banking system. Hence, centres are considered "paper" or offshore if they

[14] For instance, Cassard (1994) argues that offshore centres emerged as a result of regulations and taxes imposed on the banking activities of the developed world in particular as a consequence of the regulatory measures taken by the USA government that restricted capital export and imposed ceilings on the interest rate. In such a restrictive environment, banks started looking for alternative sites with less regulation and low costs to perform their financial activities.

hold a large volume of cross border assets by value, but without having the proper financial infrastructure to support such large holdings of financial assets.[15]

2.4.2 Financial Centres in the Developed World

Based on this criterion, the United Kingdom, United States and to a lesser extent Japan, Germany, France and Hong Kong qualify as international financial centres. These centres have very active financial markets and offer a wide range of financial services. Among these centres, the United Kingdom is the leading international financial centre in many activities. The empirical evidence shows that the United Kingdom is the leading centre in foreign exchange turnover, OTC derivative activity, international bank lending and international deposit taking activity. Furthermore, the United Kingdom is the world's biggest centre for advice on cross border mergers and acquisition and for international bonds (Edwards, 1998). In terms of stock and futures market activity, the US is the leading centre by a wide margin. But what is interesting to note is that unlike the US, the UK is more international as reflected by the dominance of foreign activity in the stock and bond exchanges.

In Europe, the growing importance of Germany and France is noticeable. These two centres have managed to increase their shares in many financial activities. During the 90's, Germany has increased its share of international bank lending, deposit taking activity and OTC derivative activity. France has increased its share of the global foreign exchange and OTC derivative activity. Furthermore, the stock, bond, and

[15] This chapter discusses briefly the importance of these "paper" centres. The main focus is on financial centres which are fully functional. These centres channel funds from lenders to borrowers, manage funds and liabilities on a world scale, act as brokers and advisers to various types of customers, clear payment across regions, and engage in dealing and trading in financial instruments.

futures markets in both these countries are highly developed as reflected in their high market capitalisation and high turnover volume.

In the 1980s, Japan was able to consolidate itself as one of the leading centres of the world. In the 1990s, Japan's position as international financial centre is much in doubt. During the last decade, Japan's share in all types of financial activity has been declining. For instance, Japan's share of cross border liabilities declined from 18% in 1987 to 7.5% in 1998. In terms of foreign exchange activity, its share of global foreign exchange turnover has declined from 11% in 1992 to 8% in 1998. The same pattern is observed in the case of OTC derivative activity where Japan's share declined from 12% in 1995 to 9% in 1998. The most astonishing development however is the rapid decline of Japan's stock turnover both in absolute and relative terms which did not only affect Japan's global position, but also its position relative to the region. Equally, important is the rapid decline in the size of the Japanese stock markets.[16]

In addition to major international financial centres, a number of banking centres have created a niche in a few activities. Switzerland, Belgium, Luxembourg and the Netherlands have become important centres for international bank lending and deposit taking activity. The importance of Netherlands and Luxembourg as centres for international bond trading has also been growing from the early 1990s.

[16] Although the East Asian crisis affected financial activity in Japanese financial markets, time series data on cross border banking and stock market activity suggest that this decline has been taking place for many years and hence this decline is not temporary.

2.4.3 Financial Centres in the Developing World

In the developing world, Hong Kong and Singapore stand out as the most important functional centres. Since the thesis's main focus is on regional centres in the developing world, this section describes in greater details the financial structure of these two centres.

Hong Kong

During the last decade, Hong Kong has established itself as one of the leading financial centres of the world. Hong Kong's financial structure is highly developed and well diversified. It provides a wide variety of financial services and its financial structure is made up of a highly developed banking system and a set of active financial markets. Furthermore, Hong Kong has also become an active centre for fund management with more than 1,800 unit trusts and funds registered. In fact, most international fund managers run their Asian business from Hong Kong . Furthermore, the Asian corporate-finance teams of international investment banks are based in Hong Kong. This can be attributed to the large number of multinational firms' offices located in Hong Kong. More than 2000 multinational firms as well as the largest accounting companies and legal advisers maintain regional offices in Hong Kong (Edwards, 1998).

Despite its outstanding performance, Hong Kong's share in most activities has been declining in the last few years. In 1995, Hong Kong was the third largest centre in the world in terms of cross border assets with a share of 8.12% of world's total cross border assets. In 1998, this share stood only at 5.18% placing Hong Kong in the sixth position. The same pattern can be observed in case of cross border liabilities where

Hong Kong's share has declined from 8.14% in 1994 to 4.74% in 1998. In fact, since the transfer of sovereignty to the Chinese rule, Hong Kong's international assets have shrunk by 22%. While the East Asian crisis has a played a role in the contraction of international banking, the huge decline of Hong Kong's external assets relative to Singapore (only 10%), suggests that other factors have been at work (BIS, 1999). Specifically, Hong Kong has suffered more than any other financial centre from the recession in Japan. Hong Kong has played an important role in the extension of the domestic intermediation of the Japanese domestic banking system by attracting funds from Japan through the interbank market and then re-lending these funds to Japanese non-bank customers. The weakness of loan demand by Japanese corporations is probably the main cause for the decline in Hong Kong's external assets. In fact, this is reflected in the data where from mid-1997 to end-1998, Hong Kong claims on non-bank Japanese fell by $115 billion. Although there has been withdrawal of bank credit from the crisis affected countries (Korea, Indonesia, Thailand), the fall of claims on corporations in these countries and China have been only $20 billion and $8 billion respectively (BIS 1999).

Hong Kong has also established itself as an important centre for foreign exchange. In 1992, Hong Kong ranked sixth after Switzerland in terms of daily turnover. By year 1995, Hong Kong overtook Switzerland and ranked fifth in the world with an average daily turnover of 90.2 billion dollars . However, in 1998, Hong Kong's share declined to 4% from 6% in 1995, placing it in sixth position and with equal footing with France. During the last few years, Hong Kong also emerged as an important centre for derivative instruments trading. However, as in the case of other types of activity, its share in this activity has declined from 2% in 1995 to 1% in 1998.

Hong Kong also has a very well developed stock market. With a market capitalisation of around $343 billion at end of 1998, the Hong Kong stock exchange is the third biggest in the Asia and Pacific region after Japan and Australia. The flexible regulatory environment where there are no restrictions on foreign ownership, no taxes on capital gains, and low brokerage fees have contributed to the growth of the equity market. Most importantly, the Hong Kong stock exchange is an important centre for raising capital for China which contributed further to the development of the equity market. In terms of turnover, Hong Kong's position in the region is less prominent. In 1998, Japan, Taiwan, Australia and China all had higher values of shares traded. Although growing fast, the debt market remains relatively thin with low volumes of trading. The small size of the economy and the Hong Kong authorities' persistent budget surpluses are cited as major factors responsible for the underdevelopment of the debt market.

It is important to note that despite Hong Kong's complex, diversified and developed financial structure, the size of its financial markets remains modest compared to the international financial centres. Although it is the third largest in the region, the capitalisation of the Hong Kong stock exchange market remains modest compared to the major international financial centres. Moreover, its turnover is modest not only compared to stock exchanges in the developed world, but also to those in the region. Despite the complexity of Hong Kong's financial structure, its derivative market remains small and its share of total turnover has been declining in recent years. Equally important, Hong Kong's debt market is very thin and underdeveloped. The underdevelopment of the debt market is due to a number of factors most notably the

lack of government securities, which in turn is caused by a highly conservative fiscal policy. It is often argued that the small size of Hong Kong firms is also another contributing factor for the underdevelopment of the bond market (Luk, 1994). This makes it very difficult and costly to raise funds in the debt market because the amounts of funds required by these firms does not justify the costs incurred in screening and information collection. Although such arguments may be valid in reference to national financial markets, they are less valid when dealing with regional or international financial centres. These centres are not expected to provide their services to local firms, but to world-wide companies and hence the small size of their economies and firms should not be a deterring factor for the development of the debt market. However, it seems that large local and regional corporations prefer to use the overseas debt markets mainly London and Luxembourg, for raising funds (Cassard, 1994). There are two main reasons for this preference. First, the requirements in Hong Kong are more stringent and fees are higher than in the Eurodollar market. Second, the information required for the issue of such bonds has become highly standardised and is usually collected by credit rating agencies. Therefore, it is unlikely that problems related to information asymmetry would affect the cost structure of banks. Therefore, borrowers can benefit from London's and Luxembourg's highly liquid Eurodollar markets and their low costs. Finally, it is worth mentioning that Hong Kong's position has been deteriorating in many traditional activities such as cross border banking, deposit taking activity and foreign exchange activity which raises doubts about Hong Kong's position as one of the leading centres of the world.

Singapore

The creation of the Asian dollar market in Singapore in the late sixties was mainly responsible for the emergence of Singapore as an important financial centre. Initially, this market provided an intermediation function between several Asian countries and Eurocurrency markets. However, this function rapidly evolved and from the early 70s Asian currency units (ACUs)[17] in Singapore played an important role in attracting funds from outside the region and lending them to the Asian region mainly Hong Kong, making Singapore an important centre for international bank lending and deposit taking activity. What is interesting to note is that Singapore has been able to maintain its share of these activities, unlike Hong Kong and Japan whose shares have declined fast over the last few years.

There are no doubts that Singapore's financial structure has become more complex. Singapore has also succeeded in becoming a regional centre for foreign exchange trading. According to BIS statistics, in 1995 Singapore ranked fourth in the world in terms of foreign exchange market turnover with an average daily turnover of 105.4 billions dollars in 1995. In 1998, Singapore maintained its position capturing 7% of global turnover.[18] What is interesting to note though is the declining share of Singapore in the global OTC derivative market activity from 7% in 1995 to 2% in

[17] Financial institutions with offshore license must keep a separate book keeping unit known as Asian Currency Units (ACUs) for dollar transactions. These ACUs are exempt from reserve requirements and their income derived from offshore operations is taxed only at 10%. Furthermore, the interest received by non -residents on their deposits in ACUs are exempt completely from any tax. Such regulatory measures and the tax concessions played an important role in the creation of the Asian dollar market in Singapore.

[18] The currency composition of foreign exchange turnover reflects the international dimension of this market. In April 1995, domestic currency business was negligible. The net foreign exchange turnover in local currency against international currencies amounted only to 5.8 billion dollars. This indicates that foreign business accounts for the bulk of the turnover which reflects the importance of Singapore as an international centre for foreign exchange trading.

1998 which suggests that Singapore has failed to consolidate its position as the regional centre for derivative activity.

Although Singapore's financial structure has become more complex, its success in diversifying its financial structure remains limited. Singapore's share of total financial activity is relatively small compared to the major international financial centres (London, New York, and Tokyo). More importantly, capital markets in Singapore remain underdeveloped. With 321 companies listed in the stock market, a total market capitalisation rate of around US$ 94.5 billion, and turnover of $50 billion at end of 1998, Singapore's stock market remains small not only relative to international financial centres, but also to regional stock markets. Furthermore, the bond market in Singapore is very thin and illiquid. In this respect, it should be mentioned that the bulk of the Asian bond issues are placed in the London Eurobond market and with the support of European banks (Cassard, 1994 ; Park, 1982). This reflects the limited role Singapore plays in raising funds for Asian corporations through this market. Finally, it is important to note that Singapore has not been successful in developing as an important centre for Euroloan and syndicate lending. However, Singapore still contributed indirectly to the growth of these markets by supplying Hong Kong with huge amounts of funds raised through the Asian dollar market.

2.5 Conclusion

In this chapter, we have provided empirical evidence on the degree of centralisation of different types of financial activity. The existing evidence suggests that international financial activity shows a strong tendency to centralise in very few financial centres. This is true for all types of financial activity, although the degree of centralisation can

vary across different financial services. In fact, Kindleberger (1983) and Daly (1991) argue that finance is more centralised than other lines of activity such as commerce or industry. This is quite a puzzling observation since the opposite is expected. Banks offer services to customers who are distributed all over the world and hence it is expected that banks will also have such a scattered distribution (Bertrand and Noyelle, 1988). Furthermore, information is an important input for the provision of financial services and hence it is expected that banks will expand all over the world to remain close to the sources of information. However, it seems that factors responsible for centralisation of financial activity in one location are stronger and offset decentralising factors. Hence, the central questions are: what are the major agglomeration forces in the financial industry? Why do financial institutions and financial activity show a high tendency to centralise? In the next three chapters, we address these questions in detail. In chapter 3, we examine the impact of information asymmetry on the degree of centralisation of cross-border lending activity. In chapter 4, we abstract from the lender-borrower relationship and examine the major processes that push banks to locate near each other. In chapter 5, we identify a major agglomeration force in financial activity, that of path dependence which suggests that once a centre is established, it will continue to attract financial activity and hence enhance the centralisation of financial activity.

Chapter 3 - Dispersion and Agglomeration Forces in Credit Activity

3.1 Introduction

The previous chapter stressed the importance of treating financial services as a heterogeneous category. One major benefit from such a treatment, which is relevant for this chapter, is that it allows us to specify which types of financial activity are likely to show the highest degree of centralisation. Equally important, it provides us with a framework to specify the type of international banking activity which is mostly associated with the emergence of financial centres.

Theoretically, it is possible to distinguish between financial services according to their informational content. In particular, it is possible to distinguish between non-standardised financial products (mainly bank loans) which utilise local information to a high degree, and highly standardised financial products which require low investment in local information. Assuming that the former type of financial activity is less standardised due to information asymmetries, it can be shown that the location of the bank relative to the source of information (i.e. the borrower) matters for the delivery of the financial product.[1] Given that certain types of borrowers follow a scattered distribution, non-standardisation is likely to act as a powerful dispersion force in certain types of financial activity. On the other hand, "transparent" or standardised financial services can be delivered to customers all around the world. Because the location of suppliers relative to borrowers or depositors is not important for standardised "transparent" financial services, banks may decide to provide them

[1] Although the main focus of this chapter is on bank lending activity, it is important to note that other types of financial activity such as OTC derivative market activities (including FX forwards and swaps) are also highly non-standardised and utilise information to a large extent. Hence, the main arguments presented in this chapter also apply to such types of financial activities. For instance, in case of OTC derivative market activities, the bank still need proximity for liquidty and offsetting risk purposes.

from a central place in order to benefit from various externalities that arise from centralisation.[2]

This chapter studies the impact of information asymmetries on the degree of centralisation of lending activity. In particular, under certain assumptions related to the structure of monitoring costs, this chapter shows that the decision of banks to establish near the source of information can act as a powerful dispersion force. This is particularly true in the case of retail borrowers who have a scattered distribution. The fact that banks want to locate near their main borrowers has been long recognised. This relationship has been analysed in the context of the theory of bank multinationality. In its crudest form, this theory simply applies the elements of the eclectic approach, established in the study of multinational corporations, to the banking firm (Gray and Gray, 1981). Few modifications have been made to take into account the importance of information and trust in the business of banking (Dunning, 1993). In this respect, many studies have emphasised a "follow the clientele" hypothesis in which the bank follows its main borrowers abroad in order to maintain an existing relationship with them, hence not losing out to local or other foreign banks. This chapter discusses the major limitations of this approach and suggests an alternative framework, based on the theory of financial intermediation, which can also explain the decision of banks to establish near borrowers. In particular, under certain assumptions related to the structure of monitoring costs, this chapter shows that there is a certain distance beyond which the bank may decide to exclude a group of borrowers from the credit market. The bank's decision to exclude borrowers is based solely on their location relative to the bank. In order for the bank to have access to

[2] The sources of these externalities are discussed in details in Chapter 4.

such customers, the bank has to locate near them.[3] For some types of lending, the value d^* defines a region such that by locating in a certain geographical location (i.e. an international financial centre), a bank can service its clients anywhere in this region at equal cost, for by assumption within that region the cost of obtaining information and monitoring costs are zero and there is no deterioration in the quality of information.

This chapter is divided into six main sections. Section 2 discusses the bank multinationality approach and its major limitations. This approach consists of various elements, many of which are not directly relevant for the discussion in this chapter. Hence, this section focuses only on the bank-borrower relationship and how maintaining such a relationship creates a motive for bank multinationalisation. Section 3 provides an alternative framework based on the theory of financial intermediation. This section provides a model in which a bank's geographical proximity to borrowers matters in the provision of certain types of financial services. One such type is banks' lending activity which requires a high degree of monitoring and information processing. Section 4 uses the main implication of the specified model to study the impact of information utilisation on different types of lending activities. Section 5 discusses the relationship between wholesale banking and financial centres. In particular, it is argued in this section that the emergence of financial centres is mainly associated with the internationalisation of wholesale banking. Section 6 discusses the impact of information technology on the agglomeration of the financial industry. The last section contains my conclusions.

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[3] In this context, it is important to note that in principle, features such as language and culture, consistency of accounting standards, and similar locally specific aspects of the business environment are usually correlated with distance.

3.2 Multinationalisation of Banks

In the early 60s, wholesale banks did not go multinational and most of their international operations were settled through correspondent banks. However, during the late 60's and early 70's, many banks preferred to deal directly with their multinational borrowers rather than depending on correspondent relationships (Hine et al, 1997; Coulbeck, 1984). The "eclectic approach" developed by Dunning (1988) is useful in explaining some possible factors behind the multinationalisation of banks. This theory, which has been primarily applied to the manufacturing MNC, synthesises three hypotheses: the organisation theory, the internalisation theory, and the location theory. Within these hypotheses, it is possible to identify three important sources of comparative advantage that may give incentives for non-financial firms to undertake foreign direct investment in foreign locations. These three sources are "firm-specific" or "ownership" advantages, such as product differentiation, managerial skills, superior marketing techniques; "internalisation-specific" advantages such as quality control and "location-specific" advantages such as low labour costs and preferential tax treatment (Dunning, 1988).

Many studies have emphasised ownership-specific advantages as the main motive for bank multinationalisation (Grubel, 1985; Aliber 1984). This view focuses on technology and knowledge transfer as the most important factors responsible for the multinationalisation of banks. Grubel (1985), for instance, argues that financial knowledge is very difficult to patent or transfer to other establishments. Furthermore, since buyers and sellers have different information about this "knowledge", it is very difficult to assign a price that satisfies both sides. Such factors may prevent the

formation of markets for intangible assets such as knowledge of marketing strategies and managerial skills. Aliber (1984) stresses the importance of technical know-how. He argues that banks that have developed low cost technologies are likely to go multinational. Regardless of the source of ownership advantage, the bank must operate abroad in order to exploit the value of such assets. Through foreign operations, the bank can " increase the return to its domestic capital above what it would have been without this move abroad" (Grubel, 1985, p. 2).

The major problem with this type of argument is that it neglects the nature of financial knowledge which is not only difficult to patent, but is also very easy to duplicate. It takes only a short period of time for competitors to acquire such knowledge which suggests that the "monopoly element is usually missing" (Casson, 1990, p.16). As such, technical know-how by itself is unlikely to be the critical element responsible for multinationalisation of banks. Instead, many studies have focused on information about borrowers as the main ownership advantage for banks.[4] Information about customers provides banks with a monopolistic advantage which it can exploit by operating abroad.[5]

Many studies have argued that the advantageous position banks have for serving existing multinational borrowers (mainly MNCs) in other unfamiliar regions is the major determinant of bank multinationalisation (Gray and Gray, 1981; Casson, 1990). The argument is that these banks are able to compete with local financial institutions

[4] In the MNC theory, this is similar to cognitive imperfection which arises when information about the service or the product is not readily available which entails costs in obtaining such information.
[5] For instance, Casson (1990) argues that " the advantage is goodwill derived from specific knowledge of the customer requirements and it is a monopolistic advantage which is not patentable and which can be transferred abroad. The internalisation of this advantage transforms domestic banks into a MNB" (p.17).

which are usually unfamiliar with MNCs' financial needs. As a result, "host" countries' banks' costs of servicing these MNCs are likely to be quite high.[6] On the other hand, "home" countries' banks can provide financial services to these multinational clients at a much cheaper cost. This ownership advantage is derived from the fact that "home" countries' banks have more information and better quality information about their multinational borrowers. According to this argument, this advantageous position in terms of information stock is acquired as a result of the past relationship and a history of continuous and regular contact between the bank and the borrower (Gray and Gray, 1981). In fact, such an ownership advantage is the basis of the "follow the clientele" hypothesis (Erramilli and Rao, 1990) which claims that following the MNCs is the first stage in the process of multinationalisation of banks. In particular, this hypothesis is usually used to explain the rapid expansion of US banks in Europe during the late sixties and early seventies. During that period, US MNCs witnessed a rapid expansion of their activities across borders. This expansion provided US banks with incentives to locate near these MNCs and provided them with substantial profitable opportunities.[7]

The fact that banks can finance MNCs' operations from their home bases as well as obtain all the relevant information through arm's length correspondence is well recognised. However, there are some reasons why banks may prefer to provide financial services themselves in the MNCs' host country. First, multinationality can

[6] This argument has been made in the context of MNBs operating in developing countries where it is argued that domestic banks are poorly equipped to meet the MNCs' requirements. However, the fact the many banks have developed offices in countries with highly complex financial structures and developed banks which can easily meet the MNCs' requirements invalidate the above argument (Aliber, 1984).

[7] An examination of the business of US banks in London in that period lends support to the above point. According to Yannopoulos (1983), "Four fifths of their (i.e. US banks in London) sterling advances and two fifths of their sterling deposits were with UK branches or UK subsidiaries of US multinational corporations " (p. 245).

reduce the costs of "external" transactions which arise when dealing with correspondents. Furthermore, transactions with correspondents may not run smoothly and as a result, some problems of principal-agents costs may arise. Multinational banks can economise on these costs by carrying such external transactions within the firm. Second, as Casson (1990) notes, "although the information can, in principle, be acquired entirely at arm's length, the establishment of wholly owned outposts may increase both the quantity and the quality of information gathered" (p.17). In this context, Casson (1990) is referring to the internal organisation of the firm. In particular, transactions within the same organisation are likely to achieve better results in terms of information gathering due to higher quality control, more efficient communication network and higher interaction between bank employees of the same firm.

Despite its usefulness, it is important to note that the above approach to bank multinationalisation is based on a few implicit rigid assumptions.[8] One such assumption is that banks, by locating near their borrowers, are able to maintain their monopoly power over the information stock. In fact, this is quite a strong assumption. It is usually the case that local and other foreign banks compete with "home" banks for a greater share of the credit market, which requires that they develop their own information about multinational borrowers. There is no reason to think that other banks are not able to develop their own information stock about certain borrowers. Equally important, this explanation does not allow for the possibility that by locating abroad, banks can develop new customers who would become their main borrowers.

[8] The main focus of this section is on the "follow the clientele" hypothesis. There are other elements in the theory of the bank multinationality that could explain the decision of banks to locate abroad. For instance, location-specific advantages provide banks with incentive to locate abroad. Such advantages

In other words, this explanation focuses only on pre-existing main customers which is quite restrictive. Furthermore, in this paradigm, the decision of banks to locate near their existing borrowers is not necessarily optimal. As in the case of manufacturing firms, the decision of banks to go multinational is mainly to protect their market shares against competitors. According to this paradigm, banks that do not locate near their main borrowers would lose the "knowledge" or "information" advantage, not only abroad, but also at home (Gray and Gray, 1981). Hence, the need to preserve information about borrowers, which also means the preservation of the bank's market share, is the main motive for bank multinationlisation. Finally, this approach neglects many of the special features of financial intermediaries. For instance, it does not specify the various functions performed by banks, of which monitoring and information processing are very important. This has resulted in the neglect of many interesting issues related to the lender-borrower relationship and the manner in which the distance between the bank and the borrower could affect such a relationship. Equally important, it neglects many important features of financial services. For instance, in this approach, it is not clear why the financial product is different from any other commodity.

3.3 Financial Intermediation Paradigm

It is possible to provide an alternative framework to explain why banks decide to locate near borrowers, based on the recent theory of financial intermediation and equilibrium credit rationing. This paradigm is useful in many respects, the most important of which is that it does not treat a bank like a manufacturing firm. Instead, this approach analyses the special functions of banks as monitors and information

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will be discussed in detail in Chapter 5. For the purpose of this section, only the bank-borrower

providers and users. In particular, it focuses on the various functions of financial intermediaries and how these functions can be affected by the location of the borrower relative to the bank. This paradigm also analyses the special features of the credit market and in particular, the relationship between the lender and the borrower which may be subject to problems of asymmetric information. As a consequence, the bank may decide to invest in information technology to screen borrowers or monitor the borrower in order to limit the risk that the borrower might implement a different project.

3.3.1 Banks as Delegated Monitors

Various models have been developed to explain the different features of financial intermediaries. Some of these models emphasise the role of banks as liquidity providers (Diamond and Dybvig, 1983); others interpret financial intermediaries as information sharing coalitions (Leland and Pyle, 1977); while some models emphasise the monitoring aspect of financial intermediaries (Diamond, 1984). This section is not intended for the review of this wide literature. Instead, the analysis here is limited to very specific models which are used to address the problem set in the introduction. Since we will be focusing on the monitoring function of banks, it is useful to discuss Diamond's (1984) model in detail which explains the emergence of banks based on economies of scale in monitoring.

Diamond (1984) develops a model in which the intermediary serves as a delegated monitor who is able to economise heavily on monitoring costs. In order for this theory to work, certain ingredients are required. First, there must be economies of scale in

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relationship is discussed.

monitoring which implies that one bank finances many projects. Second, investors are only endowed with a fraction of the total amount of the project which implies that each project requires the finance of many investors. Third, the cost of monitoring the financial intermediary should be less than the surplus gained by exploiting the economies of scale in monitoring. This last ingredient is essential for the delegated monitoring theory to work (Freixas and Rochet, 1997). Finally, we require the assumption that borrowers have more information than lenders which gives rise to a moral hazard type problem which can be solved either by monitoring or designing a debt contract which imposes a non pecuniary cost. For simplicity, it is assumed that monitoring is less costly, hence the financial intermediary decides to monitor the borrower at a cost K.

Given the above ingredients, it can be shown that the indirect lending solution dominates the direct lending since the former economises heavily on monitoring costs. To establish this, assume that each investor is endowed only with $1/m$ of the capital good so that m investors are required to finance one project. Also assume that there are nm investors such that all n projects in the economy are financed. Since each investor incurs a monitoring cost (K), the total monitoring costs involved in direct lending is nmK. On the other hand, if investors delegate this function to a financial intermediary, the total cost of monitoring would be nK which is less than nmK since by assumption m is greater than 1. Hence, lenders would prefer to delegate the monitoring function to the financial intermediary, given that the costs involved in the direct monitoring of the financial intermediary itself do not offset the gains achieved through economies of scale in monitoring. In fact, using the strong law of large numbers, Diamond (1984) shows that the bank can offer investors deposit

contracts which are risk-less, hence solving the problem of monitoring the monitor. The financial intermediary's ability to offer risk-less deposits is a direct consequence of its own diversification means. To put it differently, it is assumed that intermediaries are able to hold very large portfolios which diversify away the risk of default.

More recently, Krasa and Villamil (1992) have addressed the problem of monitoring the monitor in non-limit economies, so that the assumption of an infinite number of loans required in order to derive the large numbers result can be relaxed. In fact, Krasa and Villamil (op.cit.) show that even with a finite number of independent projects the probability of bank's insolvency goes to zero and hence the costs involved in monitoring the monitor goes to zero. Hence, even with a small size portfolio, the bank can reduce significantly the probability of default.

It is important to stress two main features of this model: (1) Monitoring decisions are made ex-ante i.e. before the loan is given and (2) there is no credit rationing in equilibrium. In this model, all projects are financed. For the purpose of this chapter, it is important that we explore the phenomenon of equilibrium credit rationing. Stiglitz and Weiss (1981) and Williamson (1986, 1987), respectively, develop two models in which equilibrium credit rationing may occur.[9] Although these two models are based

[9] Santomero (1984) defines credit rationing as a situation where " a subset of firms seeking credit at the going rate are not granted such loans in spite of the fact that their objective characteristics are identical, or nearly so, to those firms receiving credit" (p.599). This definition is specific about which cases satisfy the equilibrium credit-rationing criterion. For instance, cases where restrictions on interest rates result in credit rationing are not characterised by equilibrium credit rationing since such restrictions involve "disequilibrum" in the credit market. Another case is where the bank grants a loan to a borrower with collateral, but refuses to extend credit to a similar borrower with no collateral. The later is not considered as credit rationed because its " objective characteristics" is not identical to the former. Finally, when a bank excludes an entire group of borrowers from the credit market, this is not considered as equilibrium credit rationing, but as the "redlining" phenomenon (Frexias and Rochet, 1997).

on information asymmetry, there are some basic differences among them. This chapter uses the model developed by Williamson (1986,1987) in which ex-post monitoring is endogenously determined. This allows for equilibrium credit rationing to occur.

3.3.2 Different Stages in Making a Loan

Following Porteous (1995), it is possible to decompose the loan making process into the following five stages:

(a) Screening: This stage involves choosing borrowers from a pool of potential applicants. Based on some pre-determined criteria, the bank may decide not to extend credit to few borrowers.

(b) Processing: This stage deals with borrowers who have passed the screening stage. At this stage, the loan officer collects specific details about borrowers. This stage is very information intensive and involves the collection of various documents.

(c) Verification: The loan officer passes the information collected to the head office for verification and further analysis. At this stage, the decision is made whether to grant the loan or not. This stage may require the collection of additional information about the borrower.

(d) Administration: This stage involves book keeping and checking that the conditions of the contract are met.

(e) Monitoring: This stage is required in case of a borrower's default.[10] This phase requires a large flow of non-standardised information about the project.

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[10] Note that this gives monitoring a different meaning from Diamond where in Diamond's model monitoring is ex-ante i.e. monitoring is made before the loan is made.

The degree of standardisation differs considerably across the various stages and depends on the type of the financial service being provided. For certain types of financial contracts, the screening process is highly standardised (for instance credit card applications), hence it is not location-dependent. However, in non-standardised types of contracts such as loans, the screening stage can be location-dependent. In fact, the pre-determined criteria adopted in the screening stage are location-specific and it is usually the case that the same criteria can not be applied to borrowers from different countries.

The processing and verification phases are less standardised, hence they can still be highly dependent on the location of the bank and the ultimate source of information i.e. the borrower. This is especially true in cases where the information produced is highly unreliable due to lack of transparency in accounting and auditing procedures and/or lack of enforcement by the legal system. In such cases, banks may need to collect additional information and/or verify the information obtained from the processing stage. This may involve face to face contact with borrowers and site visits. This problem is more serious in cross-border lending activity. Even if the required information can be obtained cheaply from a distance as a result of recent advances in information technology, its quality or usefulness may deteriorate significantly with distance. This may arise due to differences in accounting and auditing procedures between countries which limit the usefulness of the obtained information or due to the fact that information is produced within a certain context which can not be transmitted with the piece of information (Porteous,1995). Such factors affect the ability of the bank to evaluate the piece of information in an efficient or even in a correct manner.

Administration functions are highly standardised and they can easily be centralised in order to capture economies of scale. Hence, administration functions are not location dependent, especially since information technology has significantly reduced the cost of transmitting information within the bank.

The costs involved in the monitoring stage, which occurs in case of a borrower's default, can be highly location-dependent (Porteous, 1995). The nature of information required at that stage is highly non-standardised. Obtaining such information may require frequent visits to the borrower which is costly in terms of time and transportation. In cases when the bank decides to seize the borrower's physical assets, these costs may increase substantially, especially if these assets represent specific, ongoing projects. For instance, taking over the project involves hiring lawyers, managers, analysts and auditors. The costs of transporting such skilled labour to the site are likely to be higher the further the bank is from the borrower. In case of cross-border banking i.e. when the bank deals with a borrower located in a different jurisdiction, the bank may face additional costs arising from dealing with a different legal system and an unfamiliar business environment. For instance, the bank may not be familiar with the bankruptcy laws of the borrower's country. In more extreme cases, law enforcement in some countries may be weak affecting the degree of the bank's control over the project.

Given that the friction of distance is likely to be greatest in the monitoring stage, this chapter uses a credit rationing model with ex-post monitoring to explain the decision of banks to locate near borrowers.[11] This requires incorporating into the model the

[11] See Porteous (1995) for a similar analysis.

assumption that monitoring costs are increasing and convex with distance. This assumption usually captures the specialisation effect: the closer is the bank relative to the borrower, the lower is the bank's monitoring costs (Sussman, 1993). The Williamson model is robust to such an extension.

3.3.3 A Model of Financial Intermediation with Ex-Monitoring Costs

Williamson (1986, 1987) develops a model with ex-post monitoring which is endogenously determined, hence allowing for equilibrium credit rationing. Williamson's model is based on the costly state verification paradigm (Townsend, 1979; Gale and Hellwig, 1985) which justifies the use of the standard debt contract. It is assumed that the outcome of the project is not observable to the lender, unless a costly audit is performed. In this context, the debt contract is optimal. In a standard debt contract, the lender and the borrower agree on a certain payment *(R)* where *R* denotes the nominal unit repayment to the bank. If the return of the project equals or exceeds the agreed payment, auditing will not take place. However, when the cash flow is less than the agreed repayment, audit will occur at a cost *c*. This last situation is interpreted as default or failure in which the bank seizes the entire return of the project. Based on the discussion of the previous section, I assume that monitoring costs *c* are increasing and convex with distance ($c = c(d)$ and $c'(d) > 0$ and $c''(d) > 0$). Notice that this assumption applies to non-standardised financial products and that non-standardisation is associated with information asymmetries.

The Williamson model does not require any assumption about the distribution of the projects' return. Let x denote the random return of the borrower's project. x has a density function $f(x)$ which is continuous and positive in its support $[\underline{x}, \bar{x}]$.

It is important to emphasise that the dominance of indirect lending over direct lending is based on the assumption that the intermediary can achieve a large portfolio of loans. This solves the problem of monitoring the monitor, since under this assumption, the bank can offer risk-less contracts to depositors.[12] This assumption must hold in order for the above theory to work.

The return to the intermediary can then be written as:

$$\rho(R) = \int_{\underline{x}}^{R} (x-c) f(x) dx + \int_{R}^{\bar{x}} Rf(x) dx \geq Kr \qquad (1)$$

The first term expresses the expected reclaim value of the project in case of borrower's default minus the monitoring costs incurred, weighted by the probability of default, while the second term expresses the agreed return received by the bank, weighted by the probability of the project's success. The last term requires that the intermediary earns expected profit per unit invested, K, equal at least to the alternative rate.[13] If this condition does not hold, intermediation will not take place.

Since f and c are continuos, ρ is continuously differentiable:

$$\rho'(R) = (R-c) f(R) - Rf(R) + \int_{R}^{\bar{x}} f(x) dx$$

[12] See the discussion at the beginning of this section.

Or

$$\rho'(R) = -cf(R) + \int_{R}^{\bar{x}} f(x)dx \qquad (2)$$

As R tends to x, the last expression is negative which implies that the profit function is strictly concave in R. As such, there exists an R^* that maximises $\rho^*(R)$.[14] This implies that an equilibrium credit rationing may arise since the expected return is not a monotonic function of the nominal interest rate on loans. Intuitively, an increase in the nominal interest has two opposing effects. On the one hand, it increases the expected return for the bank. On the other hand, it increases the probability of default or failure. Since default is costly to the bank, this will decrease the bank's expected return. As a consequence, an increase in the interest rate does not necessarily increase the bank's expected profits which depends on which of the two effects dominates.

It follows from equation (2), that $d\rho^*(R^*)/\ dc < 0$. If we assume that the bank is required to earn expected profit per unit invested, K, at least equal to the alternative rate r, then no entrepreneur with c greater than c^* would receive a loan, where c^* for simplicity is determined by the condition $\rho^*(c^*) = Kr$. Hence, for a borrower with $c>c^*$, the expected return of the bank falls below the required rate and the bank would not to extend credit to that borrower.

[13] r can be thought of as the return obtained from investment in risk free technology.

[14] Credit rationing would occur when the expected return of the bank is not a monotonic function of the nominal interest rate of the loan. In this case, it is possible that the demand and supply of credit curves do not intersect resulting in equilibrium credit rationing. Hence, in order to explain the phenomenon of credit rationing, it is required to explain why the supply of loans can be not a monotonic function of the interest rate on loans.

Since we are assuming that monitoring costs are increasing in distance between the bank and the borrower, there is a distance d^* , associated with c^*, such that the optimum profits of the bank would fall below the required return. As a consequence, the bank would not extend credit to borrowers beyond d^*. As such, all borrowers located beyond d* are excluded from the credit market. If the intermediary decides to provide loans to borrowers beyond (d^*) in an attempt to increase its market share, it must locate near her or him.

In order to carry the analysis one step further, it would be useful to classify borrower categories according to their relative location to the bank. In particular, at each location, borrowers can be ranked according to R^*, the level of contractual interest rate that maximises the bank's expected return when dealing with that group of borrowers. In order to do this, we first need to derive dR^*/dc which examines the impact of a change in monitoring costs (which is a function of bank's location relative to the borrower) on the level of interest rate that maximises the bank's expected return.

In order for R^* to be optimal, $\int_{R}^{\bar{x}} f(x)dx - cf(R^*) = 0$ has to hold for every c and R^*.

Total differentiation of the above function yields the following:

$$-f(R^*)\,dR - cf'(R^*)\,dR - f(R^*)\,dc = 0$$

Therefore,

$$- dR^* [f(R^*) + cf'(R^*)] = dc\, f(R^*)$$

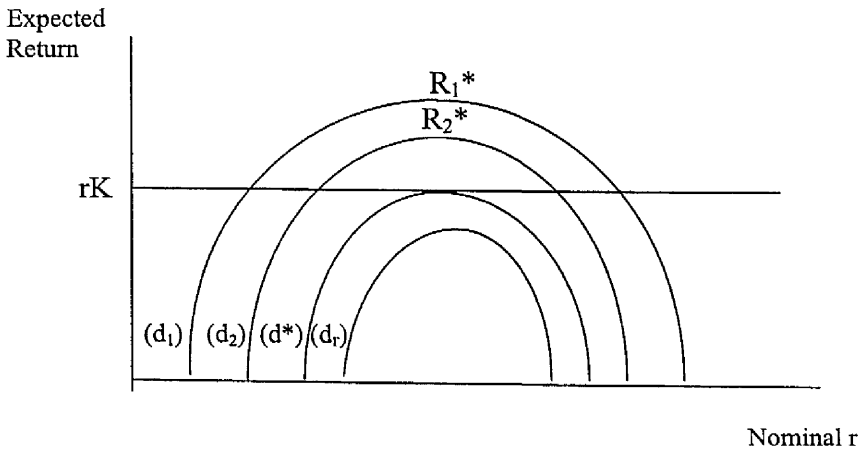
Hence,

$$dR^*/dc = - f(R^*) / [f(R^*) + c f'(R^*)]$$

This can be negative or positive depending on $f'(R^*)$ which in turn depends on assumed distribution of return. Assuming that project's returns follow a particular distribution such that $f(R^*) + c f'(R^*)$ is positive, dR^*/dc is decreasing in c. Hence, an increase in monitoring costs causes a decrease in R^*.

It follows that a group of borrowers are credit rationed out of the market because of their relative location to the bank. This follows directly from the structure of the monitoring cost which is assumed to be increasing in distance. This is made very clear in the figure below. Borrower categories are ranked according to their expected return which is not a monotonic function of the nominal interest rate of loans. The closer is a group of borrowers from the bank, the higher is R^*. This follows directly from $(dR^*/dc)/(dc/dd)$ which under certain assumption related to distribution of projects' return is less than zero. Since the bank has to earn a required return at least equal to Kr, the equilibrium would occur at the tangency of the line Kr to the "marginal" borrowers (group d^* in the figure below). Notice that d^* refers to the location of these marginal borrowers. Borrower groups above d^* would obtain credit, while borrower groups below d* are credit rationed out of the market (group d_r in the figure below).

Figure 1



One main implication of this analysis is that in order to gain access to borrowers beyond *d**, the bank may decide to locate near such borrowers. This would enable the bank to have access to previously "credit-rationed" borrowers. For instance, in an attempt to increase its share of the credit market, the bank may find it necessary to locate near borrowers. If not, the bank would not be in a position to penetrate the "foreign" market and hence its optimal portfolio would not include any loans in that region (Greenwald et al, 1993).

This framework can also be used to explain the decision of banks to follow their main borrowers abroad. If one of the bank's main customers starts operating in a region beyond *d**, the bank may not be willing to finance the foreign operations of that borrower unless the bank locates abroad near that borrower.

The monitoring cost function does not specify the shape of *c(d)*. This allows us to construct a few possible cases of how costs are likely to vary with distance. For some types of lending, mainly wholesale lending, I shall assume discontinuity such that

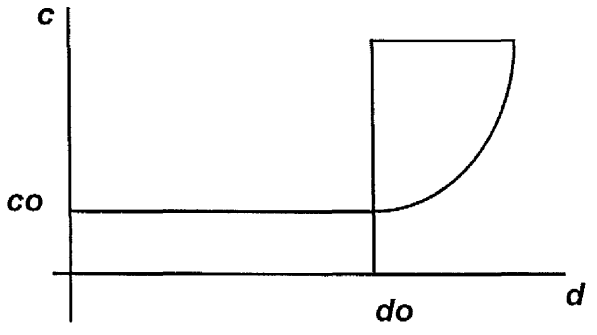
within a certain area, the optimum profits of the firm are not affected by distance. In other words, within a specific area (summarised by d_0), the costs involved in monitoring are constant. However, when distance exceeds d_0, the cost structure of the bank starts to increase. Monitoring costs may remain constant due to the fact that within that distance, the bank is able to obtain all the relevant non-standardised information through telecommunication, without its quality being affected. This could also be the case because within a certain region the bank is familiar with the legal procedures and with the business environment or because bankruptcy laws are known to be properly enforced in that region. Notice that the bank may still decide to extend credit to borrowers located beyond d_0 depending on whether the bank can achieve a risk-adjusted rate of return on banking capital higher than rate of return obtained from investing in the risk-free technology.

This structure of monitoring costs can be written as:

$$c(d) = c_o \qquad \text{if } d < d_o$$

$$c(d),\ c'(d) > 0 \text{ and } c''(d) > 0 \qquad \text{if } d > d_o$$

Figure 2



In the figure above, the costs facing the firm remain fixed until d_o, but beyond d_o monitoring costs start increasing. Whether these costs will rise fast or not depends on the region the borrower is located in. It is possible to construct a case where the costs facing the bank explodes beyond d_o. For instance, if a bank deals with borrowers in a region where the bank is not familiar with the nature of customers and business, where information produced can not be trusted, where bankruptcy laws are not enforced, or in a politically and economically unstable environment, then monitoring costs facing the firm may rise very fast. The monitoring cost function can be written as[15]:

$$c(d) = c_o \qquad \text{if } d<d_0$$

$$c_o + e^{a(d-d_o)} \qquad \text{if } d>d_o$$

The main implications of the model is that borrowers can be rationed out of the credit market because of their relative location to the bank. This feature is likely to be prevelant in cross-border banking activity since banks are likely to incur substantial costs arising from dealing with a different legal system and an unfamiliar business environment. Hence, in order for borrowers to have access to credit, they may have to locate near banks. Banks may also decide to establish offices or branches near such borrowers to in order economise on their monitoring costs and increase their market share by gaining acess to borrowers.

[15] It is important to check whether the cost function is continuous so it is consistent with differentiation and integration. Consider the function q =g(s) in N (where N is a point). The function q=g(s) has to have a limit and this limit has to be equal to g(N) for s=N (i.e. the value of the function for s=N). Three requirements must be satisfied in order for the function to be continuous: (1) g(N) has to be defined (2) the limit of g(.) for v which tends to N has to exist (3) this limit has to be equal to g(N). The above function satisfies all three conditions, hence it is continuous.

3.4 Centralisation and Dispersion in Credit Activity

The above framework can be used to examine the impact of information asymmetry on the degree of centralisation of credit activity. In order to arrive at more accurate conclusions, it is useful to make the distinction between retail and wholesale banking activity. This distinction also allows us to determine more accurately which type of financial activity is more associated with the emergence of financial centres.

Retail banking involves dealing with households and small and medium firms which are numerous and distributed all over the world. Given that the sources of information (i.e. borrowers) are scattered all over the globe, this can act as a dispersion force in the credit market. In particular, the above model shows that the location of the bank with respect to the borrower can affect the latter's access to credit. Since the distribution of borrowers is scattered, the decision of the bank to locate near borrowers can act as a powerful dispersion force in the banking industry.[16]

Despite the revolution in information technology, most of retail financial products remain non-tradable. This may be due to economic, cultural and regulatory factors (UN, 1994). The table below summarises the main tasks performed in retail-branch offices of banks. As table 3.1 shows, many retail financial services can be "technically produced" without the necessity of face to face contacts with customers. For instance, communication between customers and banks can occur through phone, post, or electronic data transfer; the withdrawal of money can occur through ATM machines, etc. However, despite the fact that many of these banking products *are technically*

[16] Furthermore, retail banking depends mainly on retail deposits as a main source for funds. Since retail depositors are highly scattered, this may produce a dispersed distribution of banks.

tradable, "international trade in retail services is still limited to very few specialised areas" (UN, 1994, p. 54) and that "international trade on a larger scale has not yet emerged due largely to non-technical factors" (UN, 1994, p.55) This is shown in table 3.1 below where *actual* trade in most of retail products is negligible, with credit activity being the least tradable. The above framework suggests an explanation for why this might be the case. Due to information asymmetries, the bank may find it necessary to establish near borrowers to increase its share of the market. In this way, the bank can gain access to previously excluded borrowers. In fact, this analysis is consistent with one of the UN report's (1994) findings when it points out that " it has not been possible to find examples of foreign banks that have been able to penetrate significantly the retail market without establishing their own branch network " (p. 54).

Table 3.1 - The Tradability of Intermediate and Final Retail-Banking Products

Product	*Tradability of Intermediate Product* [1]	*Tradability of Final Product* [2]	*Actual Trade in Product* [3]
Cash handling	None	None	-
Cheque	Book Keeping (ME) and Clearing (ME)	Poor	-
Debit Cards	Credit Rating (S) Clearing (E)	Good	+
Credit Card	Credit Rating (S) Clearing (E)	Very good	+
Bank Transfer	None	Very good	+
Home banking	None	Very good	+
Prepayment card	None	Fair	-
Current account	Interest calculation (E)	Good	-
Saving account	Interest calculation (E)	Good	-
Pension-scheme saving	Custodial Service (S)	Poor	-
Bills	Credit Rating (S)	Poor	-
Mortgage deed	Issuing and Recording (M)	Poor	-
Housing Loan	Credit Rating (S)	Fair	-
Consumer Loan	Credit Rating (S)	Fair	-
Overdraft Facility	Interest calculation (E)	Poor	-

Key:

(1) Refers to work processes that could be separated from the rest of production and produced at a Distance from the bank.

(2) This column assesses the transportability of each final product.

(3) This column indicates whether actual credit in the final product takes place

M = Manual Process; E = Electronic Process; S = Process involving skilled labour

- = Trade in financial service is negligible ; + = Significant amount of trade is taking place

Source: UN(1994)

On the other hand, wholesale banking deals with a small number of borrowers mainly MNC headquarters, other banks, and wealthy individuals. Since these borrowers show a high degree of centralisation, this may produce centralisation in wholesale banking. In fact, many of these borrowers such as MNCs and other banks are headquartered in a few centres, hence establishing offices in a few centres is sufficient for wholesale banks to remain close to borrowers. This suggests that a large part of wholesale banking does not necessarily involve regional or international trade since most wholesale banking business is performed in financial centres (See also Arndt, 1988).[17]

However, since not all multinational borrowers reside in the centre, there is also a dispersion force in wholesale banking activity because banks may find it necessary to locate abroad near multinational borrowers. However, such a dispersion force is less powerful in wholesale banking than retail banking due to two main factors. First, in general, multinational customers are likely to show a much higher degree of centralisation than retail customers. Even if they do not locate in one centre, wholesale customers are likely to centralise in a small number of centres. As a consequence, banks do not need to decentralise all over the globe. Instead, by establishing a few offices in financial and regional centres, a bank is able to locate near the main borrowers. Wholesale banks' main customers are other banks and financial firms. These firms are likely to centralise in a few centres and as a consequence, banks would only need to establish in these centres in order to be near borrowers. This has resulted in a high degree of interconnectedness between financial

[17] Equally important, wholesale banks depend mainly on the interbank market as the main source for funds. Since highly liquid interbank markets are centralised , this may enhance the centralisation of banks.

centres (Choi, 1986).[18] MNCs are also main customers of wholesale banking. Again, these are likely to show a high degree of centralisation. Given that three quarters of total multinational investment is concentrated in developed market economies (Dicken, 1992), establishing in the major financial centres of the developed world is sufficient for these banks to remain close to their multinational borrowers. The uneven distribution of private capital flows is more acute within the developing world with very few countries in Latin America and Asia having captured the bulk of these flows, especially in the boom of international private flows from 1990 to 1997. In response to this uneven flow of capital, banks locate in few regional centres, rather than decentralise in all parts of the globe.

Another important factor that may enhance the centralisation of wholesale banking is the fact that wholesale banking products are more standardised than retail financial products. Hence, wholesale banking products can be delivered from a distance without the cost structure of the bank being affected. Securitisation has increased the tradability of financial products by the separation of credit rating from issuing (as in the case of credit rating agencies who continuously evaluate and collect information on MNCs) and by the possibility of sharing financial risk (syndicate lending). Wholesale banks have also utilised information and telecommunication technology infrastructure for a longer time than retail banks, not only in back office operations, but also in customer related services (UN 1994). This had the effect of making a wider range of wholesale banking products more tradable across distances. In fact, this is supported by Table 3.2 below which shows that in general wholesale banking

[18] Choi et al (1986,1996) suggest various indicators of the degree of interconnectedness between financial centres. A linkage between the two centres is assumed to exist when a bank headquartered in some centre I has an office in centre j. Such linkage may reflect the flow of information between

products are more tradable than retail banking products. This is particularly true in risk and liquidity management functions where the actual trade in most of these financial products is quite high (except for swaps which are non-standardised). These financial services are highly standardised and hence can be delivered at a distance. On the other hand, credit activities are less standardised and hence they are less tradable. However, in general it is safe to argue that wholesale products are more tradable than retail products which may enhance further the centralisation of wholesale banking.

Table 3.2- The Tradability of Intermediate and Final Wholesale-Banking Products

Product	*Tradability of Intermediate Product*	*Tradibility of Final Product*	*Actual Trade in Product*
Bank Draft	Book Keeping (ME) Clearing (ME)	Good	+
Direct Debit	Book Keeping (ME) Clearing (ME)	Good	+
Debit Collecting	Document processing (M)	Poor	–
Letter of credit	Document processing (M) Bank Transfer (E)	Poor	+
Home-banking	None	Very Good	+
EDI	None	Very Good	+
Forward Contract	Credit Rating (S)	Good	+
Futures	Credit Rating (S)	Good	+
Options	Credit Rating (S)	Good	+
Swaps	Credit Rating (S)	None	–
Guarantee	Credit Rating (S)	Good	+
Financial loan	Credit Rating (S) Interest Calculation (E) Document processing (M)	Good	–
Loan for procurement of equity	Credit Rating (S)	Good	–
Leasing	Credit Rating (S)	Poor	–
Financial leasing	Credit Rating (S)	Good	+
Export credit Loan	Credit Rating (S) Interest Calculation (E)	Poor	–

See table (1) for key

Standardised types of financial services

The discussion has concentrated so far on credit operations which due to asymmetric information may not show a high degree of centralisation. However, not all types of financial activity utilise local information intensively. In fact, once we consider forms of financial activity other than credit activity, the emphasis on local information is no

centres. This is a very reasonable assumption especially if we think that there is a continuous flow of

longer justified. Here another benefit of treating financial products as very diverse becomes clear. Even if different types of financial activity have a tendency to be centralised within a location, the degree or the extent of such centralisation is likely to differ among the various categories depending on its informational content. Take for example trading and dealing activity which consists of the exchange of financial instruments in various financial markets. Trading in financial markets has become highly computerised. More important, these products have become highly standardised. In some markets such as the foreign exchange and government bond markets, the nature of information required (mainly macroeconomic data and political information) can be obtained by almost any trader from financial information vendors such as Reuters. Due to such factors, these types of standard or "transparent" financial services can be delivered to customers all around the world (Clark et al, 1997). Because the location of these markets relative to borrowers or depositors is not important, banks may decide to locate near each other in order to benefit from various externalities that arise from centralisation. The sources of these externalities are discussed in detail in the next chapter.

3.5 Wholesale Banking and Financial centres

The above discussion highlights the importance of the distinction between retail and wholesale banking. Although the growth of cross border lending activity and international branching occurred simultaneously during the last three decades, these two forms of expansion reflect the internationalisation of two types of banking activity: wholesale banking and retail banking respectively (Coakley, 1984). The internationalisation of retail banking activity occurred through the establishment of

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information between the parent bank and the office in that centre.

bank offices all over the globe, rather than establishing in a few international or regional centres. Despite the fact that the bank may decide to extend credit to retail borrowers at a distance, this may not be the optimal solution. In fact, if the costs involved in monitoring increase substantially beyond a certain distance, the bank may decide not to extend credit to borrowers located beyond that distance. As a consequence, the bank may lose its competitive edge to local lenders. It follows that in the case of retail banking, being close to the source of information can act as a powerful dispersion force and as such it is not likely that retail credit activity will show a high degree of centralisation. On the contrary, we are likely to witness a very wide branch expansion which is not directly connected with the growth of financial centres.

On the other hand, wholesale lending activity is likely to show a high degree of centralisation. In fact, the internationalisation of wholesale banking took the form of establishing branches in a few major international financial centres (Coakley, 1984). These centres provided banks with opportunities to locate near main borrowers since these centres are also host to a large number of MNC headquarters, other banks and wealthy individuals. Since the number of wholesale customers is small, the establishment of banks in few international financial centres and banking centres is sufficient to maintain a close relationship between banks and major borrowers.

Empirical Evidence

The internationalisation of wholesale banking was manifested by the establishment of bank offices (branches, subsidiaries, representative offices) in few financial centres, the most important of which are London and New York. In 1970, London was a host

for only 73 foreign banks. By 1993, the number of foreign banks in London had risen to 512 banks. The same pattern can be observed in New York City. In 1971, the number of foreign banks in New York was 73. By 1993, the number of foreign banks in New York had risen to 328 foreign banks (Brealy and Kaplanis, 1997).

Despite the fact that the world's major financial centres have managed to capture a large share of bank offices, international branching occurred in almost every part of the world. Table 3.3 shows the location of overseas offices of the world's largest 1000 banks in terms of assets (end of 1992). This table gives us an indication of the distribution of bank offices across different regions. According to the table 3.3, international financial centres and banking centres capture a significant share of bank offices. The leading financial centres (United Kingdom, United States, Japan, Germany, France, Hong Kong and Singapore) capture around 38% of these offices. However, it is obvious that there are limits to the extent of centralisation of banks' foreign offices. In fact, most international branching has not been associated with wholesale banking and hence it is not associated with the emergence of financial centres. In order to have a competitive position in retail markets, banks must establish offices in other parts of the world which is very much reflected in Table 3.3.

Table 3.3 - Location of Overseas Offices* of the World's Largest 1000 banks

Host country	Number of overseas offices
Latin America/Carribean	228
USA	204
Canada	55
Africa	63
Australia	85
Japan	98
Hong Kong	144
Singapore	115
Other Asia	332
Middle East	134
Spain	68
Italy	43
UK	257
France	70
Netherlands	41
Germany	96
Switzerland	92
Other Western Europe	143
East Europe	61
Offshore	232

* Bank offices include subsidiaries, branches and representative offices
Source: Brealey, R A and E.C. Kaplanis (1996)

3.6 Information Technology: An Agglomeration or Dispersion Force?

The tension between centralisation and de-centralisation within the financial services industry has been intensified by recent developments in information technology. O'Brien (1991) defines the end of geography as a concept mainly applied to international financial relationships and "refers to a state of economic development where geographical location no longer matters in finance, or matters much less than hitherto". On the one hand, the end of geography suggests that communication and information technology renders financial centres obsolete and exerts pressure on financial intermediaries towards decentralisation.[19] According to the end of geography

[19] Many economists that adopt the decentralising thesis argue that information technology merely facilitates decentralisation and is not responsible for decentralisation. According to these economists, decentralisation has to be viewed as having its own driving force. For instance, Hepworth (1990) argues that decentralisation should be viewed in the context of the conflict between the capitalist and labour class. Decentralisation is part of capitalists' strategy to diffuse the power of the labour force. Another reason is the one suggested by Vernon (1979) who argues that decentralisation occurs at later stages of the product cycle when the production process utilises large numbers of unskilled labour that can be found only in the periphery. Although these arguments have been presented in the context of the

thesis, recent advances in telecommunication and information technology undermine the importance of the location of financial institutions since these can locate in any part of the world and still provide services to their customers which are scattered all over the globe. Central to this thesis is the assumption that information technology enables banks to obtain all relevant information without being close to borrowers or competitors.

On the other hand, this thesis also suggests information technology can enhance centralisation (Martin, 1992; O'Brien, 1991). Being able to provide financial services to borrowers who are far away means that banks do not need to establish offices near them. As such, banks can locate in a centre and take advantage of all the benefits of centralisation that arise from interaction among banks and borrowers. Martin (1992) argues that "the new technologies will actually reinforce the concentration of expertise and business within existing major centres, in that firms located in the latter can now easily access customers and funds wherever these are located. In other words, the new technologies allow firms even greater possibilities to develop economies of scale and scope through concentrating activities in a relatively small number of leading financial centres, selling and servicing global products from a few strategic locations" (p. 263). Furthermore, advances in information technology have affected the degree of centralisation within financial and non-financial firms. In particular, they have increased the degree of centralisation of control and decision making within multinational borrowers such as MNCs (UN 1994, Amirahmadi and Wallace, 1995). This may increase the benefits that banks can obtain from locating near MNC headquarters which show a high degree of centralisation in few financial

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manufacturing sector, they make clear that it is not necessarily true that information technology is the

centres. Within the multinational bank, information technology may induce further centralisation in some specialised areas such as risk management and strategic planning which banks prefer to undertake in a centre (Edwards, 1998).

A running theme throughout this chapter is the assumption that distance matters in the provision of some financial products, mainly credit products such as loans. Banks by locating in certain regional financial centres are able to engage in cross-border lending to their regional borrowers without their cost structure or the quality of information being adversely affected. As far as this activity is concerned, information technology does not undermine the importance of financial centres, but actually may intensify the centralisation of financial activity by reducing the cost of obtaining information. However, we would not expect all potential borrowers to reside within that region. Banks overcome this problem by locating near borrowers. In particular, by establishing a network of branches in other regional centres, wholesale banks accrue the benefits that arise from centralisation of financial activity as well as overcome some of the problems inherent in financial intermediation. In general, the size of the network that a multinational bank wants to establish or maintain depends on the nature of its activities. In this respect, moves toward the provision of more retail services and the shift toward financing small and medium sized firms by some banks can act as a decentralising force (Jacobs et al, 1990).

In the case of "transparent" financial services, information technology may enhance further the degree of centralisation of these activities as suggested by Martin (1992). Here it is true that location of the supplier relative to the borrower does not matter

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driving force behind decentralisation as some economists tend to argue.

anymore. But precisely because of this fact, banks may still decide to provide standardised services from a financial centre in order to benefit from the externalities that arise from centralisation such as access to deeper and more liquid interbank markets, highly specialised intermediate inputs and skilled labour, and highly complex infrastructure.

The above discussion treats the financial firm as a single entity. As a consequence, the impact of information technology on the financial industry is not fully explored. In particular, the impact of information technology on front office and back office activities is neglected. Front office activities such as funding, arranging syndicated loans, raising capital, issuing new bonds, mergers and acquisitions require continuous interaction and face to face contacts with clients. Back office activities, on the other hand, do not involve direct contact with customers. The bulk of the back office activity consists of data processing, cheque processing, credit card operations and accounting services which are highly standardised.

Traditionally, back and front offices were located together or near each other. However, with technological advancement and the development of electronic data transfers, physical proximity between these two lines of activity has become less important. Given that direct contact with customers is not essential for back office activities and given that recent advances in information technology make it possible to connect and control the different parts of the bank, many banks have shifted part of their back office operations to the suburbs of the city in order to economise on costs. An important development is the electronic transfer of data between the back office and front office which replaced the paper flow facilitating the separation between

these two types of activities (Jacobs et al, 1990). In this sense, recent developments in information technology contributed to the dispersion of financial activity by moving *part* of back office activities to low cost locations and away from financial centres. The location of front offices however is not primarily affected by cost considerations, and other strategic concerns such as closeness to MNC headquarters, other competitors, skilled labour and specialised services play a greater role in the locational decision. This explains why despite the high operating costs in financial centres, financial firms still run most of their front office operations from these centres (Martin, 1992; Edwards, 1998).[20]

It is important to note that despite the possibility of shifting part of a firm's operations to cheaper locations, many financial firms have kept their back office activities close to the front office. Various back office activities require technical support and skilled labour which are usually not found in cheaper locations. These factors constrain the ability of the bank to shift its back office activities to cheaper locations. Furthermore, many small and medium financial firms may not have the necessary resources to

[20] Ota and Fujita (1993) provide a theoretical framework to explain this recent trend of organisation within some financial firms. In their model, the location problem can be viewed as the outcome of the interaction between agglomeration force in the form of informational spillovers and dispersion forces in the form of higher operating costs (higher wages and higher rents). If the firm locates at x, then its profit function can be written as: $\Pi(x) = A(x) - R(x)S_f - W(x)L_f$ where A(X) is the aggregate benefit that the firm can enjoy from operating in the financial centre (inversely related to the location of the bank with respect to the centre), R(x) and W(x) are the wages and rents prevailing at location x. Assuming that each firm consists of a front office unit (located at x) and back office unit (located at y), the profit function can be written as:

$$\Pi(x) = A(x) - R(x)S_f - W(x)L_f - R(y)S_b - W(y)L_b - \Gamma(x,y)$$

where $\Gamma(x,y)$ is the intra-firm communication costs and subscripts b and f refer to front office or back office. Assuming that the benefit function and intra-firm are linear in distance, Ota and Fujita show that at least 11 configurations are possible depending on the value of the parameters. One very interesting case where intra-firm costs are low, front offices show a high degree of agglomeration surrounded by residential area, while back office units agglomerate in the border of the city together with its employees.

undergo costly relocations. A related point is that there may be considerable sunk costs involved in shifting operations outside the centre. These costs are usually associated with construction of building, installation of information technology and computer networks, and build up of training systems for employees (Thrift, 1994). In the case of front offices, sunk costs can be more substantial since they may involve loss of clientele and weakening or even loss of established relationships with main borrowers and other banks. This is especially true in primary markets (Davis, 1990). Such sunk costs could prevent financial firms from relocating or shifting part of their activities away from centres. Finally, it is interesting to note that this pattern differs across different types of financial firms. For instance, although investment banks have exploited information technology to minimise costs, this trend is not observed in money centre banks where most back offices remain close to front offices (Jacobs et al, 1990).

3.7 Conclusion

Given the importance of information in the provision of certain types of financial services, this chapter analyses the impact of information asymmetry on the degree of centralisation of lending activity. The framework used in this chapter draws on recent models of financial intermediation. Specifically, it extends Williamson (1986) model of credit rationing with ex-post monitoring. The extension of the model is achieved through making the additional assumption that monitoring costs are increasing and convex with distance (Porteous, 1995). The cost structure can take different shapes according to the type of financial service being provided. It is important to note that this assumption applies only to non-standardised financial products and that non-standardisation is associated with information asymmetries. Based on this model, we

show that there is a certain distance beyond which the profits of the bank would fall below the required return and hence the bank decides to ration credit to borrowers located beyond that distance. In order for the bank to have access to these borrowers, for instance in an attempt to increase its share of the loan market, the bank has to establish near these borrowers. As such, information asymmetry can act as a powerful dispersion force. It is argued that this dispersion force is fully operational in retail financial services while it plays a less important role in the case of wholesale banking services. This is the case due to two main factors. First, wholesale borrowers - mainly MNC headquarters and other financial institutions - show a high degree of centralisation. Second, wholesale financial products are more standardised than retail services. These two factors enable financial institutions to engage in cross border lending and deposit taking activity from a central location, typically a financial centre. The main conclusion that emerges from this analysis is that although cross-border lending activity and international branching occurred simultaneously during the last three decades, these two forms of expansion reflect the internationalisation of two types of banking activity, wholesale and the retail banking, and it is only the former which is associated with the emergence of financial centres. In fact, the internationalisation of wholesale banking is manifested in the emergence of these centres. The impact of recent advances in information technology on the agglomeration of financial activity is also analysed. It is argued that such an impact is not straightforward and contrary to the "end of the geography" thesis's main argument, information technology can enhance the centralisation of financial activity, especially wholesale banking activity. This section also notes that the impact of information technology has contributed to the separation of front office and back

office activities, which were traditionally located near each other. However, despite these transformations, front office activities still show a high tendency to centralise.

Chapter 4 - Factors Responsible for Agglomeration of Banks

4.1 Introduction

In the previous chapter, the impact of information asymmetry on the degree of centralisation of credit activity has been examined. It was argued that while retail banking is subject to a powerful dispersion force as a result of banks' decision to locate near their main borrowers and depositors, wholesale banking is likely to show a higher degree of centralisation. Factors such as centralisation of wholesale banks' main customers and the more standardised nature of wholesale banking products can explain the high degree of centralisation of wholesale banking. In line with the previous analysis, this chapter identifies the main agglomeration and dispersion forces in the financial industry. But instead of analysing the impact of the bank-borrower relationship on the centralisation of the banking industry, this chapter focuses only on the factors that push banks to locate near each other or in other words, bank-bank relations.

Daniel's survey (1986), which examines the features that bankers consider most attractive in a geographic location, indicates that proximity to other banks is the most important factor responsible for banks to locate in London and New York (Table 4.1). Ninety percent of the 150 foreign banks interviewed consider physical proximity to US/UK banks as a major factor pushing them to locate in these two cities; 60 % of them citing this factor as the most important one. The survey also shows that proximity to foreign banks in these two markets is an important factor that affects the locational decision of banks. The empirical evidence presented in the last chapter also shows that a large number of banks agglomerate in few established financial centres. This chapter addresses the question of why banks decide to locate near each other.

Table 4.1- Ranking of factors affecting choice of London and New York for banking operations

Factor	Proportion of all banks citing factor		Proportion ranking factor as "1"	
	London	New York	London	New York
A	26	15	9	-
B	16	15	-	-
C	79	53	37	23
D	89	91	60	60
E	25	45	14	27
F	62	34	13	-
G	28	34	8	4
H	45	31	13	6
I	28	26	20	-
J	54	52	10	10

Key:
A= Availability of suitable office space
B= Satisfactory rental agreement
C= Proximity to foreign banks
D= Proximity to US/UK banks and other financial institutions
E= Proximity to headquarters of manufacturing corporations
F= Availability of suitable qualified labour
G= Access to intermediate services
H= Prestige
I= Good transport links with other UK/US metropolitan areas
J= Transport and telecommunication links with financial centres outside the US/UK
Source: Daniels (1986)

The fact that economic activity in general shows a high tendency to centralise did not initially attract the attention of economists. It is not until very recently that economists have developed a framework to explain economics of agglomeration. The main reason for this neglect is linked to the assumption of non-increasing returns to scale, which is widely used in neo-classical models. Fujita and Thisse (1996) argue that under the assumptions that non-increasing returns to scale exist and that resources are uniformly distributed, "the economy is reduced to a Robinson Crusoe type economy where each individual produces his/her own consumption" (p.342). In such a framework, any point in the map can form the basis of an autarkic economy, where goods are produced on a small scale unless the economy is open to trade. It is obvious that in such a setting, the concepts of location and agglomeration become redundant (Krugman, 1995).

In general, the location of economic activity can be viewed as an outcome of the interaction between agglomeration and dispersion forces (Kindleberger, 1974; Fujita and Thisse, 1996).[1] A major agglomeration force can be found in the existence of externalities. It is usually the norm to distinguish between two types of externalities: Technological externalities and pecuniary externalities. Technological externalities usually refer to non-market interactions which can affect directly the production function of a firm or the utility function of a consumer. Pecuniary externalities on the other hand occur through market interactions via the price mechanism. Specifically, this type of externality is associated with supply and demand linkages (Krugman, 1991).

Although both types of externalities can create agglomeration forces, the literature on financial centres has mainly focused on technological externalities.[2] In particular, these studies focus on informational spillovers among banks, which are likely to reduce the problems inherent in financial intermediation arising from information asymmetry and moral hazard (Scholtens, 1992). Many economists have argued that these informational spillovers are quite substantial and usually increase the size and

[1] The fact the location problem is generally viewed as an outcome of agglomeration and dispersion forces is seen most clearly by referring to the Hicks-Allen partial elasticity (Matsuyama, 1995). Instead of focusing on the physical characteristics of a good, Hicks and Allen argue that complementarity should be based on market demand. Hicks-Allen partial elasticity is expressed as:

$$Pi/xi * dxi/dPi = \varepsilon - \sigma$$

Allen partial elasticity holds if $\varepsilon > \sigma$. To put it in words, the equation above of partial elasticity suggests that the concentration of firms in one location results in reduction of prices and/or the loss of customers. σ in the above equation captures this effect. On the other hand, the entry of new banks into the market attracts new customers that would benefit the incumbent firms. ε captures the effect of the attraction of new customers. If the effect of attracting new customers is greater than the reduction of prices/customers effect, then financial firms will have the incentive to locate near each other in one central location. In this case, firms are complementary to each other regardless of the goods they produce.

[2] The focus of these studies on "technological externalities" is quite understandable since with technological externalities the assumption of perfect competition can be maintained.

enhance the liquidity of existing markets, such as the interbank market (Davis, 1990; Code, 1991).

Very few studies have analysed systematically the major factors responsible for the centralisation of financial activity (Davis, 1990; Scholtens, 1992). Despite their usefulness, these studies do not provide a comprehensive picture about other possible sources of agglomeration. In particular, they neglect the impact of pecuniary externalities as an agglomeration force. As Krugman (1991) emphasises, these externalities are real and are as important as technological spillovers in explaining economics of agglomeration. In a competitive market, these externalities do not exist and hence in order to explore the impact of this type of externality, we need to make the assumption of imperfect competition and increasing returns to scale in production which introduces major complexities into the analysis. For several reasons, pecuniary externalities can generate a powerful agglomeration force. For instance, it is often argued in the literature that agglomeration of financial activity produces a pool of skilled labor and allows for specialisation in intermediate services (Grilli, 1989; Davis, 1990; Scholten, 1992). Similarly, it is argued that agglomeration of banks allows for the construction of a sophisticated and complex infrastructure necessary for the operation of financial markets and the provision of financial services (Park, 1982; Scholtens, 1992). Under certain conditions, these specialisation effects can increase the productivity of banking capital and hence provide a rationale for bank agglomeration. Although these externalities are recognised in the literature on financial centres, their origins and mechanics remain unexplored. This chapter addresses more thoroughly the impact of pecuniary externalities on the agglomeration of financial activity.

This chapter is divided into four main parts. Part 2 deals with technological externalities in the financial industry. It is argued in this section that agglomeration of banks generate spillovers which have the effect of increasing the extent of the interbank markets. Part 3 deals with pecuniary externalities. It makes a distinction between financial services and producer services. It is argued that including financial services within the category of producer services does not allow for the possibility of identifying a distinct producer service complex in financial centres similar to the one found in industrial centres. In fact, financial centres, which are made up of very complex financial markets and offer a wide range of financial products, require an infrastructure of highly specialised inputs for its organisation and operation. This part describes a model where increasing returns to scale in the service industry and the desire for financial firms to employ a wide variety of specialised intermediate services can provide a possible explanation for agglomeration of financial activity. This type of externality is ignored in the existing literature on financial centres. In Part 4, it is argued that agglomeration of banks generates a pool of skilled labour which is essential for the operation of financial firms. In particular, it is shown that agglomeration of banks results in higher wages which justify investment in human capital. Furthermore, it lowers the probability of skilled labour being unemployed providing an incentive for skilled labour to centralise around banks. In Part 5, it is argued that centralisation of financial activity reduces the cost structure of financial firms by economising heavily on operating costs. This provides an additional incentive for financial firms and clients to centralise in a single centre. The last part contains my conclusion.

4.2 Informational Spillovers Among Banks: An Agglomeration Force

Studies that deal with financial centres usually equate technological externalities with informational spillovers among banks (Davis, 1990; Code, 1991). For instance, Code (1991) argues that the most important decisions are usually undertaken by a small number of people or what he calls the financial community. The financial community is highly "compact" and the members of this community are in continuous contact with each other. Despite recent advances in information technology which allows for electronic exchange of information, face to face contacts and direct interaction among members of the "financial community" still form the major source of information.[3] Furthermore, such an interaction enhances trust among banks, which is essential for transfer of funds among banks. In a similar vein, Davis (1990) argues that centralisation of banks lowers liquidity costs and improves the efficiency in establishing prices in some markets, such as the interbank market.[4] Lower liquidity costs and higher efficiency in pricing arise because these centres allow banks to have direct contacts with large number of competitors which facilitate the flow of information among banks.[5]

The international interbank market

International financial centres and banking centres play an important role in the collection and allocation of international funds between non-bank surplus units and non-bank deficit units across geographical regions. For instance, some banks are

[3] Benefits that arise from direct contact have been used to explain agglomeration in other industries. For instance, Saxenian (1994) argues that face to face communication is a major factor responsible for agglomeration of large number of firms in Silicon Valley.

[4] Davis (1990) defines liquidity as " entailing low dealing costs and rapid execution of large orders with minimum disturbance to prices " whereas efficiency refers to the notion that prices reflect all available information in the market.

[5] These studies are correct in emphasising the association between bank agglomeration and the interbank market. In fact, the bulk of interbank activity concentrates in a few financial centres around the world.

faced with excess liquidity and hence decide to channel these funds to one of the regional or international financial centres[6]. The financial centre, through its deep and liquid interbank market, distributes the available funds to bank or non-bank units who have liquidity needs. In a sense, international financial centres and banking centres form some type of network which is responsible both for the flow of capital across geographical regions. Central to this network is the international interbank market. One of the central functions of the interbank market is to match banks' liquidity requirements. Based on Diamond and Dyvbig (1983), Bhattachraya and Gale (1987) develop a model to explain the liquidity distribution function of the interbank market. In autarky where trade between banks does not take place, the bank is restricted ex-ante to its choice of investment and as such depositors bear the liquidity risk of their bank. Bhattacharya and Gale (1987) show that this risk can be completely eliminated by opening the interbank market which can decentralise the optimal allocation of funds.[7] This optimal allocation is achieved by matching liquidity needs across banks. In particular, in this model there are two types of banks: type k which faces fewer early withdrawals than the average and hence has excess liquidity and type l which faces early withdrawals and hence demands liquidity. The demand and supply of liquidity are matched in the interbank market.

This framework can easily be extended to the international interbank market. Banks in type k country may be faced with excess liquidity due to low investment opportunities. On the contrary, type l countries may have liquidity requirements say

[6] This reflects financial centre's role of fund collection.

[7] For this theory to work, a few assumptions must hold. On such assumption is that there must exist a large number of banks such that liquidity shocks are completely diversifiable. Another assumption is that liquidity shocks are observable. In case of unobservable liquidity shocks, Bhattacharya and Gale (1987) show that a second best solution dominates which involves imperfect insurance for depositors.

because of high investment opportunities. The international interbank markets, the most liquid of which are concentrated in a few financial centres, can match these liquidity needs across geographical locations by attracting idle funds from type k countries and extending interbank loans to banks in type *l* countries. This liquidity matching can result in an optimal global allocation of liquidity resources which also minimise the liquidity risk for depositors.

The interbank market is characterised by a very important feature: the flow of funds between banks occurs without the exchange of any collateral (Saunders, 1987). This indicates that the smooth operation of the interbank activity is based to a large extent on confidence among banks.[8] In order to attain and maintain this confidence, availability of information about the financial structure, investment techniques and the quality of management of other banks is vital. The question becomes, how do banks obtain such information?

There are various ways by which banks can obtain such information. Dufey and Giddy (1978) emphasise trading in the interbank market as the most efficient means for producing information. Continuous interaction in the interbank market, both by buying and selling deposits, produces information about banks and their investment techniques. It could even be argued that a large part of trading in the interbank market takes place in order to maintain this confidence among banks (BIS, 1983). Another way for banks to obtain information is through direct contact. It is not very unrealistic to assume that banks can obtain information about each other through direct contact

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It is interesting to note in this case, over-investment or under-investment (relative to the first solution) could occur depending on the size of the liquidity shock.

[8] BIS's description of the interbank market as "informal" indicates the importance of confidence in the operation of the interbank market.

and maintaining personal relationships.[9] In this case, physical proximity may be important for banks to improve the quality of their information stock about bank borrowers. Although physical proximity between banks is not essential anymore for existing inter-bank transactions, it may be still important for gathering information and enhancing trust among banks (Code 1991).

During the 1970's, very few banks participated actively in the interbank market (Saunders, 1987). The limited number of banks made possible the construction of a network based on confidence alone. Although direct contact between banks is not essential for trading anymore, the interaction and regular communications among these banks for a very long time have made this possible. The nature of this network has changed as the size of the interbank market and the number of players increased dramatically (Lewis and Davis, 1987). The increase in the number of players resulted in a greater credit risk. More important, new banks with different nationalities and features (such as different investment techniques and management strategies) became new players in this market. This contributed to the heterogeneity of the network and made the assessment of other banks much more complex. Furthermore, this situation created new types of risks; the most important of which are sovereign risk and settlement risk (Saunders, 1987). Due to these transformations, a tiering system in the interbank market was developed in which banks are classified according to their creditworthiness.[10] Such a system contributes greatly to an efficient flow of funds which is indispensable for an active interbank market. In particular, large banks

[9] According to a BIS (1983) report, " The relative ease with which such offices are able to take up funds appears to be partly due to the web of personal relations which can be established by being physically in large centres" (p. 16).

[10] The perceived creditworthiness of every bank is mainly reflected in his access to the market i.e. the size of funds that the bank can acquire and to a lesser extent in the price charged for these funds as reflected by the spreads between the best and worst borrowers which are in general very small.

usually establish credit lines which specify the maximum amount of funds that the bank is willing to extend to a particular class of borrowing banks. In some cases, lending banks also specify the maximum maturity of the loan. This suggests that the lending bank assesses the risk of different groups of banks beforehand which contributes to speedy and efficient transfer of funds. It is interesting to note that under this system, it is usually the case that large banks are able to obtain funds at a cheaper cost and/or will have a continuous access to funds while smaller banks are "red-lined" out or excluded from the interbank market (Allen and Saunders, 1986). More generally, the tiering system suggests that confidence among banks is no longer taken for granted and banks may decide to exclude other banks from the interbank market.

A framework suggested by Greenwald, Levinson and Stiglitz (1993) and based on Stiglitz and Weiss model (1981), can be used to explain some important features of the inter bank market, specifically the red-lining phenomenon. In this framework, banks are allowed to invest in a risk-less asset (government bonds). As can be seen from figure 4.1, the introduction of a risk-less asset lowers the contractual interest rate since the efficient portfolio frontier (EPF), which is defined as the tangency of a ray from the safe government bond at r_g on the vertical axis to the LF curve, occurs necessarily to the left of r*. In the present context, we can apply the same principles to bank loans to other banks instead of their loans to industrial, agricultural or other non-bank projects.

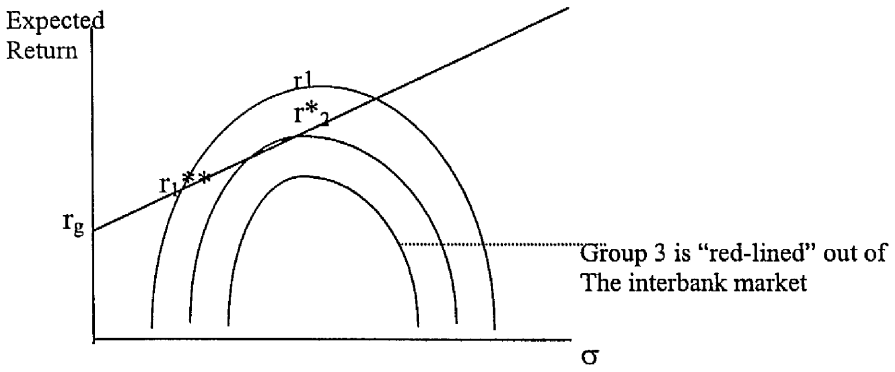
The development of a tiering system in the interbank market means that bank borrowers are classified into various risk groups, each with a different loan frontier. This feature can be integrated in a credit rationing framework by assuming that there

are several observable classes of borrower banks in the interbank market, each with a different loan frontier corresponding to the perceived riskiness of that group. This is shown in the figure below where borrower banks are ranked according to the attractiveness of their loan frontiers. The lending bank can either lend its excess funds in the interbank market or invest them in alternative assets such as government bonds which pay a return r_g at least equal to the cost of funds which for simplicity can be assumed to equal to interest rate paid on non-bank deposits.[11] At equilibrium, the level of the contractual interest rate (r^*_1,r^*_2) corresponding to the class of borrowers 1 and 2, must lie along a single line from (r_g) on the vertical axis to the final tangency with the loan frontier curve of the marginal class of borrowers.[12] The equilibrium in the credit market is obtained at r^*_2 where the efficient frontier is tangent to the loan frontier of the marginal class of borrowers (group 2 in our case). At equilibrium, total supply of funds equals total demand for funds. It is interesting to note that in the figure below, group 3 is redlined out of the interbank market. Unless r_g declines or the loan frontier of banks in the less risky groups shifts upwards, banks in that group will remain excluded from interbank market.

[11] In this context, it is assumed that interest rate on deposits is less or equal to rg. This condition will hold in any banking system which guarantees depositors against loss which make these deposits at least as safe as government bonds (GLS, 1993).

[12]For instance, if $r_1 > r_1$**, then the bank would seek only to lend to group 1. Since we are assuming competitive market, these returns are ruled out by interbank competition and investors will be

Figure 4.1



Banks in the more risky group can react to this "discrimination" in various ways. They can become more active players in the interbank market in order to improve trust and send signals to other banks about their investment practices. Regular borrowing and lending in the interbank market could achieve this. Another possible way is for these banks to locate near the major suppliers of funds. For instance, Saunders (1987) argues that the decision to include a bank in a certain group depends on the location of the bank.[13] By locating near the main players who are mainly established in the major international financial centres and banking centres, lending banks can obtain better information about borrower banks' activities. Furthermore, face to face contacts and direct interaction between bank members can enhance trust among banks, which is essential for an active and liquid interbank market. In general, under the assumptions that (a) direct contact and physical proximity facilitate the exchange of information and improve its quality and (b) that more and better quality of information can reduce various forms of risk such as credit risk, reduce monitoring

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constrained only to point r_1^{**} in the LF. On the other hand, if $r_1 < r_1^*$, then the bank will not be willing to lend to that group of borrowers.

[13] The BIS also points out that, " a bank might give a line to the London Branch of a bank but not the head office in say Latin America. A majority of banks appear to allocate the risk primarily by nationality of ownership but also make some allowance for location. Often this allowance is informal. Branches located outside major financial centres may be treated with caution; one procedure used in

costs, and other costs involved in information gathering, then the decision by financial firms to centralise in one location is "rational" since the desire to establish such contacts and information flows is satisfied more easily when financial firms concentrate in a centre. Based on these assumptions, it could be argued that other things being equal, locating near bank clusters would increase banks' access to the interbank market by shifting upwards the perceived expected return-risk loci. The above framework may also suggest that banks may be excluded from the interbank market because of their relative location to the interbank market. Therefore, easier access to an active interbank market can act as a pull factor for banks.[14]

In short, many economists have emphasised the importance of technological externalities in explaining the centralisation of financial activity in few major locations. For instance, according to Davis (1990), "external economies are precisely what international financial centres have to offer" (p. 10).[15] External economies of scale arise mainly due to information spillovers as a result of direct contact and interaction among financial firms. There are two limitations however when dealing with these types of externalities. First, in these studies, technological externalities are not modelled. In other words, the existence of these externalities enters the model as an arbitrary assumption. Second, it is very difficult to measure or quantify these informational spillovers or their impact on the agglomeration of financial activity. At

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such cases is to refer to the head office of the bank concerned to ask why that particular branch needed funds" (p.35).

[14] It is interesting to note that the above discussion points out the possibility of cumulative causation in interbank activity. Agglomeration of banks results in a more active interbank market (Choi et al 1986), but banks want to locate near their competitors since a more active market provides them with profitable business, opportunities for risk hedging and diversification, and acts as an important source for liquidity provision. Centralisation of financial institutions in a single location can also expand the size of other existing markets. One widely cited example is loan syndication (Davis 1990) which requires continuous interaction between the project manager and other financial institutions.

[15] However, as Krugman (1991) notes, this emphasis may be the result of the insistence of some economists to "preserve perfect competition" models.

best, it is possible to construct surveys to examine hypotheses about the agglomeration of financial activity. Based on the assumption that such informational spillovers among banks exist, this section has shown that this externality can act as a powerful agglomeration force.

4.3 Financial Centres and Demand for Specialised Intermediate Services

As implied in the above discussion, the literature on financial centres has focused mainly on technological externalities to explain agglomeration of financial activity and financial firms. Another type of externality, pecuniary externalities, has been neglected as a possible source of financial agglomeration. As Krugman (1991) emphasises, these externalities are real and are as important as technological spillovers in explaining the economics of agglomeration.[16] The question is, why has the literature on financial centres neglected these pecuniary externalities?

There are two main reasons for this neglect. The first is related to the fact that this type of externality does not exist in a competitive market structure. Under the assumption of perfect competition, all firms are price takers and hence benefits of interaction can not arise through usual market mechanism via the mediation of prices. Hence, in order to examine the impact of pecuniary externalities on the agglomeration of economic activity, it is essential to assume imperfect competition and increasing returns to scale in production. Under such assumptions, the analysis becomes quite complex since non-convexities are introduced into the analysis. The second factor is related to the fact that the financial industry is usually considered as part of the producer services sector. The main implication of such treatment of financial services

is that it does not allow for the possibility of identifying a distinct producer service complex in financial centres similar to the one found in industrial centres (Sassen, 1991). This is explored further below.

Recently, many studies have explored the impact of pecuniary externalities under the assumptions of imperfect competition and increasing returns to scale (Rivera-Batiz, 1988; Krugman 1991; Matsuyama, 1995; Fujita and Thisse, 1996). Such studies have shown that under these assumptions, pecuniary externalities matter and more importantly, they can act as a powerful agglomeration force. Despite their diversity, models explaining economic agglomeration constitute common elements. Increasing returns to scale in the service industry and positive transport costs can generate agglomeration forces. In fact, this idea is not original and has been known for a long time in economic theory as one of the "Marshallian externalities". However, it is not until very recently that economists tried to explore this externality in a rigorous manner.

In order to explain agglomeration of financial activity along these lines, it is essential that we first make a distinction between the financial industry and other producer services such as advertising, legal services, and accounting. Given that there is no single classification of services and the difficulty of handling output concepts in the service industry, this is not an easy task. A widely used classification is based on the distinction between services meeting final demand (consumer services) and those meeting intermediate demand also known as producer services. Consumer and producer services could be further subdivided according to the utility they provide

[16] Krugman (1991) writes: " if one firm's actions affect the demand for the product of another firm

(Daniels, 1993). Some services yield immediate utility (restaurants, cinemas), while others offer medium term (automobile repair, taxation advice) or long term utility (life insurance).

It has been the norm in the literature to include banking and financial services within the producer service category (Daniels, 1993). Despite the fact that few banking products satisfy this category, the treatment of all types of financial services as producer services is quite binding. In fact, this classification fails to recognise that the financial service category is very diverse and equally important, it neglects recent innovations in the financial industry, which have changed the nature of financial products and the financial industry. As emphasised in the previous chapter, within the category of financial services, it is possible to distinguish between trading and credit activities (Thrift, 1987). Despite the fact that they are provided by financial firms, these products have different characteristics. While lending activity accrues income in the form of interest, trading activities accrue income in the form of commissions or fees. This implies that the credit product is somehow different. In particular, when a bank grants a loan to a borrower, both parties enter in a contract which specifies among many things, the interest rate, the amount of repayment and the action to be undertaken by the borrower. This contract which entails the transfer of funds satisfies the demand of the borrower. In other words, the utility is originally attached to the loan which suggests that the loan[17] made to the borrower satisfies his need for money. This is different from trading activities where utility is not derived from the actual consumption of the product, but rather from the ease and speed with which the

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whose price exceeds marginal cost, this is as much a real externality as if one firm's research and development spills over into the general knowledge pool" (pp. 485).

[17] That idea conforms to the idea of a utility function represented in (μ, σ) space. But a Fisher type utility function is inter-temporal (c_1,c_2) space implies the loan is used because c_1 and c_2 have utility.

product is purchased or sold. In other words, utility is derived from the tradability of the financial product (Sassen, 1991). This distinction has an important implication. While credit products such as loans can be considered as inputs necessary for the production of a non-financial firm, many types of financial products (shares, bonds, option, etc) are closer to commodities rather than to intermediate inputs in the sense that utility from these services is not obtained from their consumption like in the case of other services such as accounting or advertising, but from their tradable nature.

The treatment of financial products as part of producer services did not allow for the fact that financial centres could support a producer service complex on its own. Financial centres, which constitute a set of very complex and diverse financial markets, require in addition to skilled labour and capital, "a vast infrastructure of highly specialised services" (Sassen, 1991). Such services are not only important for the organisation and operations of markets, but can also create new products and expand existing markets.

Demand for specialised producer services

The main objective of this section is to describe a simple model of economic agglomeration. In this model, only two sectors are considered: the financial sector and the producer service sector. It is assumed that banks produce an output given a certain technology which is summarised by the following production function:

$$X = L^a D_s^c \qquad (1)$$

Where X is the banks' output, L is the amount of labour required to produce X and D_s is a sub production function of the variety of intermediate services the features of which will be explained below. *a, b,* and *c* are the shares of expenditure on each type of inputs.

In order to take into account the banks' preference for variety of intermediate inputs, we need a special utility function for D_s. Following Dixit and Stiglitz (1977), the preference for variety is presented by a concave sub-utility function which takes the following form[18]:

$$U_i(D_{i1}, D_{i2}, \ldots) = \left(\sum_{i=1}^{n} D_i^{\rho} \right)^{1/\rho} \quad 0 < \rho < 1 \text{ where } \rho = 1 - 1/\sigma$$

Where *Di* is the quantity of variety *i* consumed by an individual, *n* is the number of varieties available and σ is the elasticity of substitution between two varieties. The sub-utility function above has three important properties: First, every pair of varieties can be substituted for each other. Second, the degree of substitution does not depend on the level of consumption of other varieties. Finally and most importantly, it reveals the fact that variety is valued per se. In particular, the parameter ρ can be interpreted as the desire for consuming a variety of consumer goods. When ρ is close to one, consumer goods are close to perfect substitutes and the consumer does not place any value on variety. On the other hand, as ρ declines towards zero, the desire to consume a variety of consumer goods increases.

[18] This section draws on the discussions by Helpman and Krugman (1985), Rivera-Batiz (1988) and Matsuyama (1995).

Moving from the consumer utility function to the production function is straightforward. In particular, the RHS of the above equation can be used as a production function of a competitive firm (Ethier, 1982). In other words, the RHS can be interpreted as a sub production function of a firm which is a composite of differentiated goods. Hence, *Ds* in equation 1 is sub-utility production function which takes the following form:

$$D_s = \left(\sum_{i=1}^{n} D_i^{\rho} \right)^{1/\rho} \qquad 0 < \rho < 1 \text{ where } \rho = 1 - 1/\sigma \qquad (2)$$

Where *Di* is amount of specialised input i demanded by financial firms, n is the range of intermediate inputs, and ρ in this case represents the desire by the banking firm to employ a greater variety of inputs which usually reflect increased specialisation of labour across variety of activities . Note that in order to make sense of imperfect competition in the service sector, we require that σ (the elasticity of substitution between two inputs) be greater than 1 otherwise as we shall see later, we would obtain negative marginal revenue. The concavity of the sub-production function implies that a bank will always choose a wide variety of intermediate service, given that their prices do not differ much. In the case when all intermediate services are equally priced (P_{Di}) (which is the case at equilibrium), then whatever the level of spending (E), the banking sector would demand all types of intermediate services (Helpman and Krugman, 1985).[19] Given this assumption, then the sub-production function can be written as:

[19] This is a simplifying assumption which does not alter the main results of the model.

$$D_s = n^{1/\rho} D_i \qquad (3)$$

Given that $D = nDi$ (D is total demand for intermediate services), the above equation can be written as:

$$D_s = D\, n^{(1-\rho)/\rho} \qquad (4)$$

Substituting equation (4) in (1), yields the following fundamental equation:

$$X = n^{c(1-\rho)/\rho} L^a D^c \qquad (5)$$

Equation 5 captures the idea that the provision of a wider variety of specialised services shifts outwards the banks' production function . In particular, an increase in the number of specialised inputs can increase the level of output without changing the amounts of inputs utilised.[20] This result is obtained because of our inclusion of the sub production function D_s which reflects the desire of the bank to employ specialised services. Note that the shift in the production function depends on the value of ρ. When ρ approaches one, the influence of n disappears since all services become perfect substitutes. On the other hand, when ρ declines towards zero, the variety of intermediate services matter and hence we will witness a shift in the production function.

Now suppose that the price of the banking is P, then the profit function of the banking firm can be written as:

[20] This idea goes back to Young (1928) who notes that growth can be sustained by increased specialisation of labour across an increasing variety of activities.

$$\pi = PX - wL - \sum_{i=1}^{n} P_D D_i \qquad (6)$$

The problem is to choose L and Di that maximises the profit function. This first order conditions are:

$$P\, aX/L = W \qquad (7)$$

$$D_i = [cPX/D_s^{\rho}\, P]^{1/1-\rho} \qquad (8)$$

The supply of intermediate inputs: Pricing, Output and Diversity Decisions

The intermediate sector is assumed to operate under monopolistic competition a-la Dixit and Stiglitz (1977). This assumption is not unrealistic. On the one hand, the service sector is highly competitive and barriers to entry and exit are minor. On the other hand, demanders have very specialised tastes in respect of the sectors' products, allowing for differentiation of the service sector. The differentiation between brands of lawyers, accountants, etc. derives mainly from considerations of trust and the stock of relational knowledge.

Given that the service sector is labour intensive, I assume that labour is the only input used in the provision of intermediate services. The labour requirement for a service firm is :

$$L_i = \alpha + \beta D_i \qquad (9)$$

Where L_i is the total labour requirement, α is the fixed labour requirement, β is variable labour, and D_i is the demand facing the service firm. In the Chamberlinian framework, it is assumed that the technologies used by these service firms are identical i.e. α and β are the same for all service firms.

The production function of each firm in the intermediate sector exhibits internal economies of scale. This can be easily shown by constructing the average cost function which is decreasing as a function of the quantity produced[21]:

$$AC_i = wL_i/D_i = w\beta + \alpha\omega/D_i$$

Profit maximisation requires that we equate marginal revenue to marginal cost:

$$w\beta = P_{Di}(\varepsilon_i - 1/\varepsilon_i) \qquad (10)$$

where ε_i is the elasticity of the demand facing the firm i.e. $\varepsilon_i = (P_{Di}/D_i)(\partial D_i/(\partial P_{Di})$.

In order to derive the price charged by each firm, it is obvious we need to determine ε_i. Assuming (1) that each firm acts on the conjecture that other firms in the sector would not change their output to changes in the firm's own price and (2) that there is

[21] Although the firms are subject to increasing returns, the downward sloping demand ensures that output can't grow indefinitely.

a large number of firms in the market such that the influence of each firm's output on total output is insignificant, then the elasticity of demand can be written as[22]:

$$\varepsilon_i = 1/1-\rho \qquad (11)$$

Notice that as ρ approaches 1, elasticity of demand tends to infinity. The economic explanation for this is that as ρ increases towards one, the bank does not value specialisation and treats all inputs as perfect substitutes. As a result, all firms in the market can supply these services resulting in an increase in competition and hence the response of quantity demanded to a change in the price is quite high. On the other hand, when ρ declines, then the bank values more differentiated services allowing each firm to affect its demand and hence reducing the value of elasticity.

Substituting (11) in (10) we get:

$$P_{Di} = \rho^{-1} \beta w \qquad (12)$$

Where P_{Di} is the price of an intermediate input and w is the wage rate in the economy. This equation tells us that the firm maximises its profits by setting the price equal to the marginal cost plus a mark-up. Note that the mark-up is an inverse function of

[22] There are various ways to derive the elasticity of demand. Equation 8 describes a demand curve facing a single service sector firm. Let us consider another service producer, say j. Then, it is possible to obtain the following relationship: $D_i = D_j (P_j/Pi)^{1/1-\rho}$. Under the assumption that the number of firms is large enough such that the behaviour of one firm does not influence the behaviour of other producer services (as in the Chamberlinian framework), the above relationship represents the demand faced by firm i, given Pj and qj. This demand curve has a constant elasticity of 1/1-ρ (Ethier, 1982).

ρ. As ρ declines towards zero, the differentiation required by the banking sector increases, giving the service more power to increase the mark-up.

In order to derive the quantity produced by each firm, we assume free entry such that a large number of firms operate in the market driving profits to zero. The firm would attain zero profits when its total revenues $(P_{Di}D_i)$ equals to total costs (wL_i). Using equations 8 and 12, the quantity supplied by each firm such that profits are zero can be expressed as:

$$D_i = (\alpha/\beta)(\rho/1-\rho) \qquad (13)$$

In order to determine the number of firms in equilibrium, we need the assumption that each differentiated good is produced by a single firm. In the Chamberlinian framework, firms can differentiate their products without incurring any costs. Given that the demand for products is symmetric, then it is not profitable for firms to share the demand with other firms. Given this assumption, then we can write $P_D * Di * n = P_D * D$. Hence, the number of firms in the market is:

$$n = (\beta/\alpha)(1/\rho-1)D \qquad (14)$$

Equation (14) states that the smaller the fixed costs, the larger the variable component, the less the degree of substitution between financial products, and most important the higher the demand for specialised services from financial firms, the larger the number of specialised firms. This last effect is important since it reflects endogenous agglomeration economies i.e. a larger D will result in larger n. In other

words, a larger market would result in a more specialised and wider variety of these inputs shifting the financial sector's production function.[23] It is important to realise the cumulative causation effect in the above description. Financial agglomeration allows for the provision of a wider variety and more specialised services. This is expected to improve the productivity of the financial sector, resulting in greater demand for these services which may reinforce further specialisation of the service industry.

It is clear that in order to make sense of agglomeration, we need the assumption of non-tradability of some services. In other words, the increase in the demand can be achieved by localisation of banks which is likely to increase the "extent of the market" (Stigler, 1951).[24] That geography still matters in the provision of some services is assumed throughout the thesis. First, the costs of delivery of some services may increase substantially beyond a certain distance. Second, despite the revolution in information and telecommunication technology and the technical possibility of trade in some services, not all services are actually being traded across regional (or national) borders. Other cultural, regulatory and economic factors can influence the actual tradability of these services. Many of the above mentioned intermediate inputs (legal services, real estate services, advertising services) still require some form of presence in the local market and hence are likely to be influenced by centralisation of demand. In fact, this is supported by the fact that most of the intermediate service industries are centralised in the very few cities in the world that are also locations for

[23] In particular, a larger market makes it worth paying the fixed cost of producing a large number of intermediate inputs which in turn improve the productivity of the banking firm. This idea is widely used in modelling of endogenous growth (Aghion and Howitt, 1998).

[24] Stigler argues that: " Localisation is one method of increasing the economic size of an industry and achieving the gains from specialisation. The auxiliary and complementary industries that must operate in intimate co-operation can seldom do so efficiently at a distance" (Stigler 1951, p. 56).

a large number of banks and multinational corporate headquarters (Smith and Walters, 1997).[25]

It is important to note that agglomeration economies also depend on the extent to which financial institutions "externalise" the purchases of such intermediate inputs. If most of these services were provided from within the bank (vertical integration), then these economies would not exist. Whether most of these services are provided internally or not requires empirical investigation. Unfortunately, data on the volume of banks' expenditure on these services or the ratio of "internal" to "external" expenditures are not available for most banks. However, Daniels' survey (1986) provides us with some evidence on the importance of external purchases in the banking industry. In this survey, bankers were asked to specify the proportion of intermediate services provided internally and externally to the bank. Intermediate services are divided into the following categories: Marketing, accounting, computing, insurance, legal, real estate, and advertising services. The results of the survey indicate a clear dichotomy among these services. While most of marketing, accounting, and computing services are provided "in-house", insurance, legal and real estate services are mostly obtained from external sources. For instance, around 78% of banks interviewed obtain more than 70% of their accounting services internally, while around 65% of banks obtain most of their legal services from external sources. More importantly, the survey shows that banks have increased the external demand for these services because these banks can obtain highly specialised services at lower costs. The survey also indicates that most of external demand concentrates in

[25] Of course, lines of activity other than finance usually require these services. However, this does not negate the fact that financial firms may decide to locate in cities where producers services are highly efficient. In fact, some scholars consider that the development of financial centres is the highest stage

Manhattan and the City of London. At least 70% of these banks' external purchases are concentrated in these two areas. Suppliers in metropolitan regions may also benefit, but to a much lesser extent. Suppliers beyond metropolitan regions do not benefit at all from foreign banks' presence.

In short, under certain assumptions regarding tradability of services, it is shown in this section that financial firms' demand for differentiated intermediate services can generate a powerful agglomeration force. Rather than treating financial services as a part of the producer services or simply as an input required for the production of non-financial firms, most financial products have become close to commodities where utility is not derived from the consumption of the service, but rather from trading the financial service. i.e. tradability is the basis of utility. The organisation and operation of financial markets and institutions, which constitute a financial centre, require the use of such intermediate service. Based on this categorisation, it has been shown in a partial equilibrium model how the desire to employ a wide variety of specialised services can generate an agglomeration force. In particular, agglomeration of financial activity, which creates a localised demand, can support the establishment of a highly specialised service complex.

4.4 Agglomeration of Firms and a Market for Skilled Labour

The provision of financial services depends to a large extent on a highly qualified and specialised labour force. In fact, Walter's survey (1988) shows that skilled labour is the most important input for the provision of most types of financial services. Hence, the desire to acquire skilled labour can provide an incentive for banks to locate in

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of metropolitan development which is achieved only after certain level of development of intermediate

certain geographical areas. There are strong reasons to think that agglomeration of firms allows for a pool of highly skilled labour (Grilli, 1989).[26] One reason is that agglomeration of firms, which entails competition between firms for skilled labour in a centre, allows for a level of wages high enough to justify investment in human capital (Rotemberg and Saloner, 1990). If wages fall below a certain level, it may discourage labour from acquiring the necessary skills required by financial firms. Human capital externalities can in turn cause an increase in productivity gains (Rauch, 1991). Going back to the model suggested above, it could be shown that the level of wages is positively related to the number of firms at equilibrium. Substituting equation (5) in (7) yields the following result:

$$W = P\, a\, L^{a-1}\, K^{b}\, D^{c}\, n^{c/(1-\sigma)} \qquad (15)$$

Equation (15) shows that the level of wages is positively related to the number of firms. The number of specialised services in a location affects wages in both banking and service sectors due to the assumption of homogenous labour.

Krugman considers a model in which the interaction between increasing returns to scale and uncertainty of demand for labour provides firms and skilled labour with incentives to centralise in one location. Consider n banks with uncertain and imperfectly correlated demands for labour. This could be due to the fact that banks provide different types of services, the demand for which is uncertain and not

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services is attained (Kindleberger 1974).

[26] Although it is cheaper for financial institutions to cover search costs, it is not necessarily that they will pay lower wages for skilled labour in a financial centre. This depends on the nature of the labour market which could differ from one location to another (Walter 1988). However, regardless of the costs, financial centres by attracting the highly skilled and specialised workers will provide the financial institutions with the best quality of labour at low search costs.

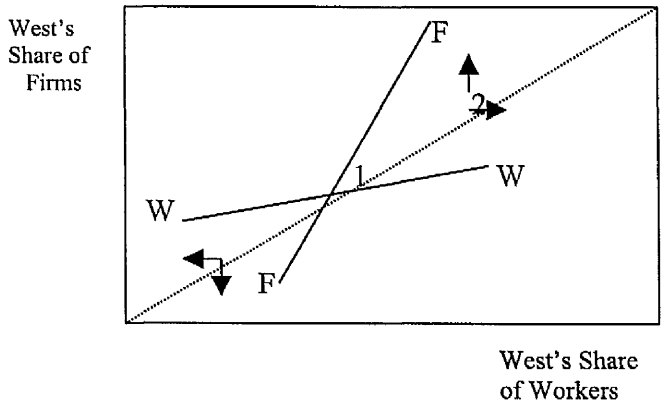
perfectly correlated. It could also be the case that banks are subject to firm-specific shocks as a result of their past lending policies, management practices or their exposure to different types of borrowers.[27] Because of the uncertainty of demand for their labour, skilled labour has the incentive to locate where there are a large number of firms. In line with the above model, it is assumed that each bank can operate in one location only (West or East). In other words, the model requires that banks have the incentive to choose one location over the other, otherwise agglomeration forces would not arise. The assumption of increasing returns to scale entails that firms concentrate in a single location, rather than disperse in space. Although there is not much evidence for the existence of increasing economies of scale in financial production in the technological sense, there are undoubtedly other external economies, discussed in this chapter, which provide banks with incentives to centralise in a single centre.

The main results of Krugman's model can be derived from figure 4.2 below. The upward sloping curve WW that shows the distribution of banks and labour in a location (west) that will leave skilled labour indifferent between the two locations. Intuitively, given the number of banks, skilled workers prefer to share the demand for labour with fewer workers. In order to compensate for this increased competition, the number of banks in a location must increase.[28] In a similar manner, it is also possible to derive the curve that leaves banks indifferent to their locations (FF). Given a certain pool of skilled labour, banks prefer to share the available labour with fewer firms. In order to compensate for this, the number of skilled workers has to increase.

[27] In other words, uncertainty in the demand for financial services generates uncertain demand for labour.

The main conclusions of the model can be illustrated by graph 4.2 below which shows that there are three possible equilibrium points with point 1 being unstable. [29] The graph indicates that both banks and skilled labour have the incentive to centralise in one location. Centralising in a single location maximises both the expected wages and expected profits. The location chosen is indeterminate and depends of course on the initial conditions such as the initial distribution of skilled labour and firms.[30]

Figure 4.2



Although the model is quite simple, it clearly shows that there are gains from centralising in one location. The fact that financial centres provide a pool of skilled labour for banks has been recognised by many economists before (Grilli, 1989: Davis, 1990). However, how this pool comes about was never explained. Krugman's model suggests useful insights into this matter. First, competition among a larger number of banks may push wages upward in the market for skilled labour giving an incentive for skilled labour to centralise around these firms. Second, skilled labourers have the incentive to centralise around those banks because the probability of being

[28] This might suggest that risk aversion on behalf of labourers is responsible for labour market pooling. Although it is important , this assumption is not required. Even if we assume that labourers are risk neutral, the conclusions of the model still hold.

[29] We need to show that the FF is steeper than WW. Points below FF are preferred to points above FF because they offer banks with larger pool of skilled labour. Points above WW are preferred to those below WW because at that point, larger share of firms. Now consider point 2 where the number of

unemployed is much lower than other areas characterised by smaller number of firms.[31] Finally, a market for skilled labour provide banks with incentive to locate near that pool not necessarily because wages are lower, but because the availability of skilled labour increases the expected profit for banks providing them with the incentive to locate near a pool of skilled labour.[32] In short, Krugman's model shows that this externality produces not only agglomeration of firms, but also agglomeration of skilled workers. [33]

In addittion to these agglomeration forces, some economists have argued that economising on operational costs can generate a powerful agglomeration force (Park, 1982). By centralising in one location, financial institutions can share the fixed costs of a complex infrastructure such as communicative infrastructure, education schemes, settlement systems, payment systems, and document transport systems which are necessary for the provision of financial services (Thrift, 1994). This has the effect of reducing banks' individual costs (Scholtens, 1992: UN, 1994). Many economists consider that economising on operating costs is the major factor responsible for the agglomeration of financial firms. For instance, Park (1982) argues that " it would be cost inefficient to establish an elaborate infrastructure of international finance in each country to service just one national market. By locating most international banking

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firms is larger and labour market is deeper. At point 2, both skilled labour and banks prefer that location (i.e. point 2 has to be above WW and below FF). This occurs only if FF is steeper than WW.

[30] These initial conditions are discussed in the next chapter.

[31] This result is attained because of the assumption of uncertain demand for labour.

[32] For instance, financial firms' access to professional expertise in the major international financial centres is cited as a major factor responsible for the concentration of derivative activity in those centres. The incapability of other banking centres such as Hong Kong and Singapore to increase their share of derivative activity is due to the lack of such professional expertise (Cassard, 1994).

[33] As Krugman notices, this type of externality has been recognised by Alfred Marshal who writes: " A localised industry gains a great advantage from the fact it offers constant market for skills. Employers are apt to resort to any place they are likely to find a good choice of workers with special skill which they require; while men seeking employment naturally go to places where there are many employers who need such skills as theirs..." (cited in Krugman 1991, p. 37).

and financial infrastructure in one central place, banks can spread their overhead costs in servicing clients in various countries."

It is unlikely that a financial firm would build its own a private network of communication since such an option is very costly for any individual bank to undertake.[34] Instead, the bank can make use of an available infrastructure, which is likely to be established in a few major cities where other financial institutions and MNCs headquarters concentrate. It is important to note that the establishment of such a complex infrastructure may not materialise if banks do not centralise in few locations. In fact, financial firms may decide to locate in certain geographical locations near their competitors because they perceive that centralisation of activity is likely to facilitate the establishment of a complex infrastructure. A scattered distribution of firms may not justify public or private investment in infrastructure due to low levels of demand (Goddard, 1991; Scholtens, 1992).[35]

It is important to note that against agglomeration forces, there are various dispersion forces that tend to diffuse financial activity. Different time zones can generate decentralising forces and is cited as an important factor for the emergence of offshore centres (Kindleberger, 1974). Another widely cited force is the fact that the costs of inputs in a financial centre can be very high (Grubel, 1980). High levels of operating costs such as rents, transportation costs, and wages may act as a deterrent, driving financial activity away from financial centres to other areas with lower costs and thus

[34] Some banks have established their own private network of information and communication technology. However, only very large banks (such as Citibank) were able to do so. Instead, most of the medium and small sized banks make use of private network established by larger banks or independent service firms or connect to public networks. This last option has been widely adopted mainly to benefit from payment clearing activities (UN, 1994).

counteracting the forces of agglomeration. Finally, many economists have suggested that information technology can act as powerful dispersion force. However, as discussed in the previous chapter, the impact of information technology is not straightforward and could act either as dispersion or an agglomeration force.

4.5 Conclusion

This chapter has identified many processes that may cause agglomeration of financial activity. Although many of these processes also apply to other firms and types of economic activity, I have shown the significance of the special features of the financial industry and the unique role of the financial firm as information producer and user. Given that information is an important input for the provision of financial services and given that its efficient use can create profitable opportunities, this chapter emphasised the importance of informational spillovers between banks as generating an agglomeration force. Information spillovers among banks can increase the extent of existing markets, such as the interbank market by reducing the problems related to information asymmetry and by enhancing trust which is essential for the operation of the interbank market. This chapter has also made an attempt to differentiate between financial products and other producer services and examined the implication of this separation for the agglomeration of financial firms. In particular, this separation allowed us to examine the possibility of identifying a distinct producer service complex in financial centres similar to the one found in industrial centres. This chapter has also considered how bank agglomeration can generate a pool of a highly skilled labour. Given the importance of skilled labour for financial production, the creation of a pool of highly skilled labour provides an incentive for banks to locate

[35] This is similar to the argument made above about the importance of localisation of demand on the

near each other. Finally, centralising in a centre greatly economises heavily on banks' operating, acting as an additional agglomeration force in the financial industry.

provision of intermediate services.

Chapter 5 - Path Dependence in the Growth of Banking Centres

5.1 Introduction

The previous chapter has identified the major processes responsible for the agglomeration of banks in a few centres. This chapter identifies another such force, that of path dependence. Financial centres can be subject to path dependence in the sense that once a financial centre has attracted a certain level of financial activity, it is likely to maintain its advantage over other locations for a considerable period of time. In other words, a path dependence process can create a momentum that reinforces the self-growth of certain established financial centres. Such a "self reinforcing mechanism" can continue for a very long time and banks and other financial firms would be reluctant to establish in other locations, unless some radical changes take place that alter the attractiveness of an established centre (Jones, 1992b).

The main objective of this chapter is to analyse the path dependence process in the financial industry in detail. Arthur's conceptual framework (1988, 1989) is very useful in explaining many important aspects of the path dependence process. In this framework, neither chance nor economic determinism can solely determine the agglomeration of economic activity in a location. Instead, the interaction between geographical benefits and "external" or "agglomeration" economies plays the primary role in the determination of the location of economic activity. The application of Arthur's framework to the financial industry provides some useful insights on the major features of financial centres. However, this framework suffers from one main shortcoming: it does not allow for the path dependence process to be broken and therefore appears to be inconsistent with historical and empirical evidence. Historically, financial centres have been subject to both growth and decline. An

important example is Beirut which has lost its role as the financial centre of the Middle East as a result of strong shocks, mainly political instability and civil war. Another recent example from the same region is Bahrain which has failed to diversify its financial infrastructure and has lost a large part of its banking activity to other centres. Unlike Beirut, Bahrain did not witness a strong shock, but rather a series of small shocks. Structural changes in international financial markets, deregulation of financial markets in many parts of the Middle East, and poor economic performance of the region have undermined the role of Bahrain as a "collection centre".[1] The empirical evidence presented in chapter 2 suggests that during the 1990s, financial centres in Asia, especially Japan and Hong Kong, have lost a large share of their financial activity to other centres. It is not clear whether the decline of these two centres' activity is permanent, but the evidence shows clearly that financial centres are dynamic establishments. More importantly, the evidence suggests that despite the fact that path dependence can act as a powerful agglomeration force, a shift to a new negative growth path could occur due to a strong shock or a series of small shocks.

This chapter is divided into five sections. In section 2, the theoretical framework, which forms the basis for this chapter's analysis, is presented. In section 3, the static and dynamic benefits in a location are analysed while section 4 discusses how a decline in dynamic benefits over time or due to a shock can break the path dependence process. The last section contains my conclusions.

[1] In reality, all financial centres are affected by negative shocks. However, such negative shocks will not necessarily place the centre on a declining path. Despite negative shocks, the centre is likely to maintain its advantage to reinforce its growth. Hence, we should not generalise from Middle Eastern centres as these centres have been subject to very strong shocks which are largely region specific.

5.2 Arthur's Theoretical Framework

Arthur (1988) argues that " firms that are not tied to raw material localities and that do not compete for local customers are often attracted by the presence of other firms in a region. More densely settled regions offer better infrastructure, deeper labour markets, more specialised legal and financial services, better local availability of inventory and parts, and more opportunity to do business face to face" (p.90). Although Arthur was not addressing the location of financial activity or the financial firm, his description fits these types of firms very well. Financial institutions operating in a centre do not need physical raw materials. Furthermore, financial firms are usually attracted to areas where financial activity and other competitors centralise because such centralisation generates substantial external economies of scale such as an access to a pool of skilled labour, specialised intermediate inputs and sophisticated infrastructure.

The model proposed by Arthur (1988a,1989) provides the general framework for the analysis of the location decision of banks. In his model, Arthur constructs a payoff for a firm that wants to establish in a specific region. Assume that there are two groups of banks (A and B), with equal number of banks in each group, but different preferences for regions. Group A favours region j while group B favours region i. The payoff or the net present value of a bank of group A locating in region j is described as:

$$NPV^{A}_{j}(y_j) = B^{A}_{j} + g(y_j)$$

B^{A}_{j} are "geographical benefits" inherent in region j and $g(y_j)$ are the benefits derived from the presence of other firms in region j or what Arthur calls "agglomeration

benefits".[2] Thus, the net present value of a bank A locating in region j depends on the inherent geographical benefits, which are enhanced by agglomeration benefits as a result of the existence of other firms in region j.

Agglomeration Benefits

Each firm, one by one, is allowed to establish in the location that maximises its payoff or NPV. An element of " chance " is introduced in the model. Although it is not possible to know which firm is going to appear in the next round, the probability of some firm within a particular type appearing next is known. In other words, the next economic action can not be determined in this system; only the probability that the next economic action will happen is known to the observer (Arthur, 1994). If p_A is the probability that a firm of group A will appear next, then the probability that a region j will be chosen can be written as $q_j = \sum pk \, for \; k \in K$ where K is the set of types of firms that maximise their net present value by locating in region j i.e. K is the set of firms with $NPV_j\,(y_j) > NPV_i(y_i)$.

Starting from zero firms, entry into the market by individual firms, sequentially or firm by firm, is assumed. If one region (region j in our case), either because of chance or its geographical attributes, was able to attract a certain share of the industry's activity, its ability to attract further firms is enhanced. In fact, it can be shown that if benefits from agglomeration increase without bound, then with probability of unity "one of the regions will gain enough firms to offer sufficient location advantages to shut the other regions out in all subsequent locational choices. From then on, each firm entering in the industry will choose this region, and this region's share of industry

[2] The previous chapter has discussed in details these agglomeration benefits.

will tend to 100 percent with the others' shares tending to zero percent" (Arthur, 1988, p. 90). This suggests that regardless of banks' preferences, the new entrant would always choose region j. This is the case because agglomeration benefits in region j are great enough such that NPV_j (y_j) always exceed NPV_i (y_i). Hence, there is a tendency towards complete agglomeration in one location because the benefits that arise from agglomeration are substantial and increase with the number of banks in that location.

In this framework, the location of economic activity can not be explained solely by "economic determinism." We know with certainty than one region is able to "lock-in" financial activity, but we can not predict which region is likely to assume this role. It is quite obvious that the self-reinforcing mechanism creates multiple solutions for the location problem . Many factors interact in determining the location of financial activity. These factors can be purely geographical, historical, institutional, or cultural (Grilli, 1989). Arthur focuses on "historical chance" as a very important determinant of the location of economic activity. He argues that we "can not explain the observed patterns of cities by economic determinism alone without reference to chance events, coincidences and circumstances in the past. And without the knowledge of chance events, coincidences, and circumstances yet to come, we can not predict with accuracy the shape of the urban system in the future" (p. 96).[3] More importantly, this reasoning suggests that the path dependence process can not be reversed. In other words, the ability of a centre to attract a large share of financial activity before other

[3] Robert Hall provides a similar argument when he argues that: "... the distribution of economic activity is probably close to indeterminate, so the location of economic hot spots is largely a matter of historical accidents." (Robert Hall, " Noise over Space and Over Time", 1988 Arthur Okun Memorial Lectures, Cited in Grilli, 1989).

centres is all that matters. This condition ensures that the centre remains in a dominant position.

Despite its usefulness, it is important that we make some major modifications to the above framework to take into account the major features of financial centres. It is true that agglomeration of financial activity is likely to produce positive externalities which tend to reinforce path dependence; however the history of financial centres suggests that financial centres are dynamic establishments that are always subject to rises and falls. The historical and empirical evidence suggests quite clearly that a path dependence process can be broken reducing or even eliminating the initial advantage of an established centre (Porteous, 1995). Hence, in order to apply the above framework to financial centres, it is important to take into account the possibility of a shift to a new growth path. This requires that we extend the framework to include not only the bank entry process, but also other features that could enhance or diminish the attractiveness of a certain location. Such features (discussed in detail below) can be captured by the term B in the above payoff. Shocks or continuos transformations in a centres' features can lead to a shift to a new negative growth path.

The proportion-to-probability mapping can explain more fully the path dependence process and the possibility of a shift to a new growth path. In this mapping, all we need to know is the probability (p_j) that a certain region will be chosen next. This probability is a function of the region's current share (proportion) of the industry (n_j/N). If the probability of a firm locating in a region is greater than the current industry's share $(pj > n_j/N)$, then the country's share of the industry tends to rise. On the other hand, if the probability of the firm locating in a region is less than the

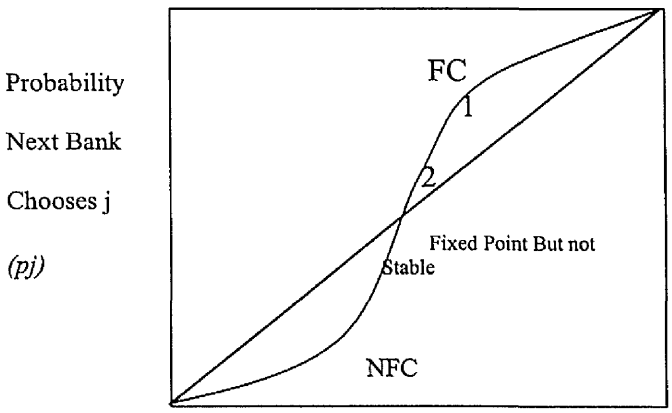
region's current share of the industry, then the opposite will happen, i.e. the region's share will decline. However, as the number of firms increase, changes in proportions would fluctuate much less and will eventually disappear. In particular, when the probability of a firm entering a region is equal to the share's industry, then the region's share would become stable.[4]

The figure below shows the probability of region j receiving the next firm as a function of the proportion of industry in region j. The non-convexity of the probability-proportion function implies that the location problem has multiple solutions.[5] The figure below shows that there are two possible solutions: 0 or 1. If a certain region has attracted a large number of firms (FC in the figure below), it is likely to keep attracting other financial firms and the region's share will converge to a stable point (1). On the contrary, if a region is at point (NFC), then it is likely to converge to point zero. It is possible to visualise a case where two centres find themselves at two different points in the probability-proportion function with one centre attracting most of the financial activity while the other is continuously losing its share to the other one (Porteous, 1995).

[4] The elements for formal proof of the above hypothesis can be found in Arthur (1988).

[5] It is important to note that the probability function takes the following form due to the presence of increasing returns to scale. As Arthur (1988) argues, that " to establish non-convexity, all we need is the existence of at least one unstable point, a watershed share of the industry, above which the region with share exerts enough attraction to increase its share and below which it tends to lose its share. Yet in a way, this is another definition of the presence of agglomeration economies: if above a certain density of settlement a region tends to attract further density, and if below it tends to lose density, there must be some agglomeration mechanism present. The underlying system will then be non-convex, and history will count" (p. 95).

Figure 5.1



More relevant for my analysis is that it is possible for a country to find itself on a declining part of the probability-proportion function after being on the increasing part of the function. This may be the result of a shock which may cause the financial centre to lose its attractiveness. A more interesting case is when the decline in "geographical" benefits (analysed in the next section), accompanied by a series of small external shocks, reshape the probability map and a financial centre would find itself in the declining part.

Some points are worth mentioning regarding the change of a centre's position on the probability-proportion function. First, the more established a financial centre is, the greater the shock is needed for that financial centre to find itself on a declining part. Second, great external shocks to the economy such as wars (in the case of Lebanon) or the enforcement of anti-laundering laws (Bahamas, Panama) can place an established centre in a declining part of the function.[6] In the above model, the shock must be big enough such that p_j fall below (n_j/N). This condition corresponds to a

situation where the NPV of establishing in region j declines fast enough such that alternative regions become more attractive for all banks. Third, small shocks may move a centre from 1 to 2 in the above figure, but at point 2, the financial centre still has the advantage to reinforce its growth. This requires that p_j still exceeds n_j/N or $NPV_j > NPV_i$ despite the effect of the shock. Fourth, a succession of small shocks over time can place a financial centre on a declining path. This is the most interesting case. If there are some transformations that make a region unattractive over a long period of time, or due to obsolescence the centre loses its comparative advantage, then it is possible for that centre to find itself on the declining part of the probability-proportion function.

5.3 Static and Dynamic Benefits of a Location

The term B, the geographical benefits in the payoff, captures the inherent advantages in a geographical location.[7] The literature on financial centres has identified many conditions that a geographical location must satisfy in order to emerge as a centre. Banks tend to locate in centres characterised by strategic location that are easily accessible to international and/or regional intermediaries and their clients, good communications and supportive services, a regulatory climate favourable to the financial industry, general economic and political stability, a favourable balance of payments, a strong and stable currency, a historical character, modern infrastructure, skilled labour market, efficient clearing system, etc. (Scholtens, 1992). These features constitute a source of advantage for certain locations, which are responsible for attracting financial activity, especially banking. To put it differently, banks that

[6] Although such shocks are important in explaining the fall of some centres, these will not discussed in this chapter, as these are quite obvious.

[7] The concept of inherent advantage is similar to the concept of "natural" comparative advantage developed in trade theory or "location-specific" advantages developed in the MNC theory.

establish in such locations can benefit greatly from these inherent advantages, hence increasing the payoff to financial institutions for that locational decision.[8]

Other than the fact that some of these features are very general[9], the above approach suffers from one serious limitation. It attempts to explain the attractiveness of financial centres in terms of static factor endowments while in reality, financial centres are dynamic establishments subject to growth and decline. In particular, static inherent advantages can not account for transformations in the probability-proportion mapping and hence adopting such an approach can result in a very fixed understanding of financial centres. In fact, the "static" advantages might explain why some cities emerged as financial centres, but can not explain why some centres maintain or lose their supremacy (Jones, 1992b).[10] This suggests that inherent advantages in a geographical location may change over time and thus it would be more accurate for the first term of the payoff to be written as B_t where t is a time subscript (Porteous, 1995). These inherent advantages may change due to political shocks, transformation in the real economy, technological advances, economic shocks, and regulatory changes. Some locational advantages become obsolete, while others are created.

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[8] In terms of MNC theory, such location-specific advantages provide banks with an incentive to establish in such locations. By locating abroad, the bank can reap the benefits of location advantages (Dunning, 1988).

[9] The above list is so large that some of the conditions cited are necessary for the establishment of any other lines of activity and not necessary finance. For instance, political and economic stability is cited as important for the attraction of financial activity. However, this condition is necessary for the establishment of any line of activity.

[10] Commenting on this point, Geoffrey Jones (1992) argues that "factor endowments approach might suggest that international financial centres developed in economies with abundant or surplus capital. This may help to explain the growth of London in the nineteenth century, and the subsequent emergence of New York and Tokyo, but it does not explain London's continued primacy when Britain ceased to be a capital exporter, or New York's when the United States became a net debtor."

In addition to the static advantages mentioned previously, it is important that the payoff be very comprehensive to include other dynamic "benefits" which can enhance the attractiveness of certain locations.[11] This section emphasises three major features which enhance the attractiveness of a location. These are the ability of the centre to reduce the cost structure of financial firms, to generate profitable business opportunities, and to attract information flows. It is argued in this chapter that these features are the major determinants of the location of financial activity. More importantly, these features of financial centres can change over time (i.e. they are dynamic) and hence their inclusion in the general payoff function allows for the possibility of a shift to a new (negative) growth path. In particular, a decline in these dynamic benefits over time can reduce the "inherent advantages" of a centre and hence an established centre may find itself in the declining part of the probability-proportion function.

5.3.1 The Tax and Regulatory Structure: Reducing Financial Firms' Cost Structure

Many economists have emphasised the importance of the tax and regulatory structure in the emergence of financial centres (Cassard, 1994). In the "eclectic approach" as applied to banks, government regulations are considered as an important location-specific advantage which provides banks with an incentive to establish in certain locations (Dunning, 1993). Banking activities are usually subject to a number of restrictions in onshore markets. For instance, banks are usually subject to controls on market entry, restricting banks from operating or branching to certain regions or states. Further restrictions can be imposed on the types of financial services that could be delivered to borrowers and depositors. Both these restrictions can affect the

[11] In addition, I think those factors such as public infrastructure, time zone, etc. are quite obvious and

volume of the banks' operations and limit their ability for diversification. Furthermore, there are other restrictions on the amounts of funds that banks can lend to a single corporation and the interest rates charged on loans and offered on deposits. Of great importance in this century have been the required reserve ratios, which act as a tax on financial intermediation (Fry, 1995).

Many multinational banks have been able to avoid regulations by locating in certain centres. By avoiding regulations, multinational banks are able to achieve higher rates of return on banking capital adjusted for risk (Gray and Gray, 1981; Cassard, 1994). This can be made clear by considering the determinants of the rate of return on banking capital which can be written as:

$$P(1-t)/EQ = P(1-t)/EA * EA/TA * TA/E$$

P is profits before taxes, EQ is the value of bank equity (paid-in capital and surplus and retained profits) t is the marginal tax rate, EA is earning assets and TA is total assets. Fierce competition in an unregulated market is likely to result in lower ratios of profit to earning assets than the ratios obtained in the regulated market. However, an unregulated market allows for higher ratio of earning assets to total assets since banks are not subject to reserve requirements and hold only a small fraction of their assets in the form of reserves (Rivera-Batiz, 1994). Furthermore, banks by attracting large volumes of financial activity are able to increase their total assets and hence increase their financial leverage. These markets not only attract borrowers, but also depositors for they offer higher rates of return on deposits as well as provide

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nothing much can be added. Instead, I focus only on regulatory and real factors.

depositors with tax incentives such as low withholding tax rates. This is expected to increase the overall activity in these centres. Under favourable conditions, the increase in the last two ratios of the above equation is likely to offset the decline in the ratio of profits to earning assets.[12] Consequently, the ratio of profit to total equity would be greater in an unregulated market. In addition, the after tax rates of return would also be higher since these markets are usually subject to lower taxation.[13]

Many economists have argued that tax and regulatory measures are sufficient to provide an explanation for the emergence and rise of financial centres. Because these centres enable banks to increase the rate of return on their capital and because they can offer higher rates of return on deposits, these centres attract a large number of financial institutions and financial assets (Cassard 1994). Although this explanation is valid, it is rather one sided. It is true that tax and regulatory structure can explain the location of banks in microstates and small islands, but they can not account for the expansion of foreign banks in the US where corporate and withholding taxes have been relatively high and the regulatory structure has been very restrictive.[14] Furthermore, this approach can not explain the continuous supremacy of a few financial centres despite the recent movements towards full financial liberalisation in many countries. Recent waves of deregulation must have reduced considerably the

[12] It is important to note that the thesis doesn't address central banks' monitoring role as part of the regulation variable. Although tighter regulations by monetary authorities may affect adversely banks' profitability and volume of business, such regulations may enhance the soundness of the banking system, lower systematic risk and produce "reputable" effects which are necessary for the sustainability of a financial centre.

[13] Higher rates of return should be offset against the risk of the variations of profitability as the result of foreign exchange exposure, higher leverage ratios and greater maturity mismatching. However, it should be stressed that these risks are associated with the position of the bank and not necessarily with the unregulated market.

[14] The failure to distinguish between different types of financial centres limits our understanding of the emergence of centres. In particular, the regulatory and tax structure contributed greatly to the emergence of functional banking centres and was decisive in explaining the rise of "booking" or

"inherent advantage" of established centres, but financial activity still shows a high tendency to centralise in a few centres. One possible explanation is that *regulatory and tax incentives must have placed a few centres in a positive growth path which resulted over time in a self reinforcing mechanism due to the existence of agglomeration forces*. In other words, although low taxes and a flexible regulatory structure have a diminished importance as determinants of the location of financial activity, such features must have constituted a source of competitive edge for the "first movers". As a result, these centres were able to attract a critical mass of financial activity large enough to propagate agglomeration forces, hence reinforcing the growth of these centres.

5.3.2 Profitable business opportunities: Trade Activity and Foreign Direct Investment

Trade activity provides banks with important business opportunities (Smith and Walter, 1997). Goods are usually exchanged across borders and in different currencies. This gives rise to a number of potential risks such as credit risk (inability of the importer to pay his bill due to insolvency), foreign exchange risk (the possibility that the price of a currency moves either against the importer or the exporter) or country risk (the inability of the importer to pay his bill because of exchange controls or other regime changes). Because of these potential risks, most payments relating to international trade take place through banks. This may prove quite profitable for banks. Banks charge fees for services such as issuing letters of credit and collection of payments. Furthermore, they can earn income on activities related to the purchase and sale of foreign exchange as well as interest income from

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"paper" centres. However, the regulatory and tax structure can not account for the centralisation of

extending credit to importers. Hence, many banks find it profitable to locate in regions characterised by high volumes of trade activity. For instance, if a country A is a big exporter to country B, then banks in country A have an incentive to locate in B. This activity creates demand for banks' services especially if payment settlement occurs through the foreign branch of the "home" bank. Of course, this can be done through correspondent banks. However, in countries where there are doubts about the creditworthiness of corespondent banks, the establishment of subsidiaries or branches in these areas becomes necessary. Furthermore, even if creditworthy corespondents are available, a bank may still have the incentive to establish in that region since it can internalise its transactions reducing transaction costs and contributing to better management of its operations. In short, regions with large volumes of trade are likely to increase the payoff to financial firms' locational decision placing the region in a more favourable part of the probability-proportion function.

Potential sources of business opportunities also arise in regions which attract large flows of foreign direct investment. The flow of foreign direct investment into certain regions creates potential sources for deposits and loans as well as generates demand for other types of services such as portfolio management, syndicated loans, or share flotation providing banks with opportunities to earn fees and interest income. Hence, an inherent advantage of a geographical location is its physical proximity to the location of foreign direct investment. In particular, the attractiveness of certain locations is affected by their ability to attract MNCs' headquarters or regional headquarters. Because MNC headquarters generate demand for banks' services, banks have the incentive to locate in regions that attract MNC headquarters.

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financial activity in the major international financial centres such as Tokyo or New York.

5.3.3 *Regular flow of information*

Given that financial firms are heavy users of information, banks are likely to agglomerate in locations which attract large flows of information. In particular, that location must receive information which is a) timely; b) reliable c) and valuable or profitable (Porteous, 1995).

The ability of a geographical location to receive timely information depends on natural inherent advantages such as its time zone or geographic location. More importantly, timely information depends on a complex telecommunication and information technology infrastructure which reduces the cost and speeds up the process of acquiring information. The centralisation of other related industries such as research agencies, universities, and other public and governmental agencies are also likely to enhance the timely flow of information in a location.

Throughout this thesis, it has been assumed that the quality of information deteriorates with distance as modelled explicitly in chapter 3. Hence, the ability of a location to provide reliable and high quality information depends on its position near the major sources of information such as borrowers, lenders, traders and other banks. Hence, geographical locations that attract MNCs are likely to attract reliable flows of information. In a similar manner, it could be argued that countries that are active in financing trade activity could also attract large flows of information. For instance, trade creates expectations about future flows of goods that determine the flow of foreign direct investment. Another important source for information is banks themselves. Few economists have argued that large volumes of information are generated by the interaction of financial institutions with each other (Code 1991).

Hence, locations which attract large number of banks are likely to be characterised by a timely flow of reliable information.

Finally, the ability of a location to generate valuable information depends on the type of financial activity involved. For instance, in case of tradable financial instruments the ability to act very fast on a piece of information is vital. This requires that the centre contain very deep and liquid markets with large trading opportunities which provide conditions in which transactions can be made quickly and at low cost; minimise the risk of illiquidity; and reduce large fluctuations in asset prices (Porteous 1995, Economists Advisory Group, 1984). These can be only achieved in centres with high volumes of business. Furthermore, large volumes of business may generate large flows of information. For instance, the Economists Advisory Group (1984) argues that " where an asset is rarely traded, information about it is hard to come by, but where there is a regular and substantial flow of business, brokers, journalists and others find it worthwhile to conduct research" (p.15).

It was argued that the ability of a location to attract information flows, generate profitable business opportunities, and minimise tax and regulatory costs contribute to the agglomeration of financial activity in that location. However, these agglomeration forces are not static. They can change significantly over time. Continuous decline in these benefits over time due to a series of small shocks can lead to a shift to a new (negative) growth. In terms of the general payoff, a decline in these dynamic benefits may cause the term B_t in the above payoff to decline enough to offset the benefits from agglomeration, hence decreasing the NPV of that centre relative to others. For instance, a series of shocks that hit the centre's regional economies or the centre's

financial structure in such a way that it re-directs the flow of information away from certain geographical location and/or decreases profitable opportunities available for financial firms is likely to place the centre in the declining part of the probability-proportion function. In a similar fashion, the impact of the regulatory and tax structure on the agglomeration of financial activity can change over time. For instance, it could be argued that regulatory and tax incentives were responsible for the attractiveness of a geographical location at the first place. By attracting a certain number of firms at the beginning, some regions' positions were enhanced because of economies of agglomeration enabling them to attract more and more firms, hence reinforcing the attractiveness of those centres. However, the position of a financial centre in the probability-proportion function may change due to factors such as deregulation in all parts of the world which may render this advantage obsolete. If as a consequence, the payoff of a location becomes relatively less attractive, then the centre may lose out part of its share of financial activity to more attractive centres.

5.4 Conclusion

This chapter has discussed the path dependence process in financial centres. Path dependence powerfully interact with agglomeration forces since it suggest that once a centre has attracted a certain level of financial activity, it would continue to do so. However, this analysis is incomplete since it takes into account only the bank entry process. In fact, there are many other features which are responsible for attracting financial firms to a location. The literature's main focus has been on static factors such as political and economic stability, time zone, etc. Despite their importance, these static factors can not account for the possibility of path dependence reversal. Furthermore, the focus on static factors resulted in a very fixed understanding of

financial centres. A more fruitful avenue to explore is the impact of a location's dynamic benefits on the agglomeration of financial activity. This chapter has discussed three such benefits which are important for attracting financial firms to a certain location. In particular, locations that reduce banks' cost structure, provide them with profitable business opportunities and attract large flows of information are likely to attract large number of banks. It is important to stress that these benefits are dynamic in the sense that they can increase or decrease over time. Including these dynamic benefits in the payoff allows for a shift to a new (negative) growth path. In particular, a decline in these benefits over time can result in the fall of some established centres and hence cause a possible dispersion of financial activity or re-centralisation of financial activity and firms in other centres.

Chapter 6 - Determinants of Competitiveness of Banking Centres

6.1 Introduction

During the 1970s and 1980s, banks' reliance on correspondent relationships declined in importance and instead multinational banks started dealing directly with their main customers abroad. This has resulted in a dramatic growth in multinational banking in which US banks have taken a leading role (Pecchioli, 1983). The "eclectic approach", primarily applied to the manufacturing MNC, has been widely used to explain the rapid growth of multinational banking during that period (Grubel, 1977; Gray and Gray, 1981; Aliber, 1984; Sabi, 1987). The eclectic theory identifies three possible sources that may provide banks with incentives to go multinational. These three sources are ownership-specific advantages, internalisation-specific advantages and location- specific advantages (Dunning, 1993). The main focus of empirical studies has been on identifying the main location-specific advantages of the world's major financial centres. The focus on financial centres is mainly due to the fact that many of the world's largest multinational banks have established offices in major international financial centres.

Two approaches have been used to identify the location-specific advantages relevant for financial firms. The first approach consists of conducting open interviews with bankers and/or constructing questionnaires aimed at identifying the major factors that push multinational banks to establish bank offices in these centres (Daniels, 1986; Ter Hart and Piersma, 1990). The second approach uses econometric analysis to study the major determinants of the location pattern of the world's largest banks across centres (Choi et al, 1986, 1996) and/or examine the major factors responsible for banks to locate in an international financial centre, mainly the US and the UK (Grosse and

Goldberg, 1991; Fisher and Molyneux, 1996). Given that a financial centre's competitiveness can be measured by its ability to attract a large number of banks and high volumes of financial activity, such empirical studies contribute to the literature on financial centres by identifying the major determinants of competitiveness of financial centres.

This chapter is divided into three main parts. The first part provides a critical review of the existing empirical literature. Such a review allows us to identify various empirical approaches and the main problems associated with testing empirically the determinants of financial centre's competitiveness. The empirical studies dealing with financial centres can be divided into three different groups according to the nature of the issues they tackle.[1] The first group examines the determinants of competitiveness of a financial centre where competitiveness of a centre is measured by its ability to attract a large number banks or large volumes of financial activity. This type of work is mainly associated with Goldberg et al (1989), Choi el al (1986,1996), Heinkel and Levi (1992) and Hultman and McGee (1989). A related group of studies focuses on the major determinants of cross-border deposits. The focus on deposits can be justified since deposits are the main source of funds for banks. Furthermore, banks tend to establish in areas where there are large inflows of deposits. This line of work is associated mainly with Grilli (1989) and Alworth and Anderson (1992). The third group deals with the issue of multinationality of banks and tries to address the following question: What are the major factors that push banks to move abroad? The main focus of these studies is on the expansion of US banks abroad. This work is

[1] Although the various empirical studies answer different questions, they are very inter-related and all aim at providing useful insights about the major determinants of financial centres and financial activity.

mainly associated with Goldberg and Saunders (1980, 1981) and Goldberg and Johnson (1990).

The review of existing studies shows that despite its usefulness, empirical work on financial centres is not very informative. Given that these studies test different hypotheses, it is not possible to reach definite conclusions regarding the major determinants of financial centres' competitiveness. This is complicated by the fact that empirical studies use a variety of dependent variables to capture the competitiveness of centres. Although various measures of competitiveness should in principle be highly correlated, the review shows that the impact of explanatory variables is different according to the dependent variable being used. Further problems arise due to the fact that many determinants of competitiveness of financial centres are qualitative in nature and hence it is necessary first to transform these variables into quantitative ones. This transformation process is difficult and involves subjective considerations, which can create doubts about the main implications of the empirical models.

In the second part, an alternative empirical framework based on the theoretical discussions of chapters 3 and 4 is presented. The method used in this section is different from the existing literature in many aspects. First, empirical analysis is only limited to the location of banks in the world's major financial centres. As discussed in chapter 2, multinationalisation of banks took the form of establishing bank offices throughout the world in order to provide financial services to retail and corporate customers. Hence, the inclusion of a large number of countries in the sample may not necessarily be capturing the decision of banks to locate in financial centres. This section develops a measure of financial diversity based on the variety of financial

products provided and the level of complexity and size of a centre's financial markets. Only centres with highly diversified financial markets are included. Furthermore, using logit and probit analysis, this chapter examines the impact of explanatory variables on the probability that a bank would establish in a centre. Given the nature of the hypotheses tested, setting the problem in terms of probabilities can be more meaningful. The last part contains my conclusions.

6.2 Review of the Empirical Literature

The main objective of this section is to review the existing empirical studies in detail. Empirical studies can be divided into three groups according to the issues they tackle. Despite the fact that they deal with different issues, these studies are very related and all three groups provide useful insights about the location-specific advantages of financial centres.

The determinants of competitiveness of financial centres

Goldberg, Helsley, and Levi's (1989) study is aimed at identifying the major factors responsible for a city to emerge as a financial centre where financial centre is defined as a location which attracts large volumes of financial activity.[2] The dependent variable used in the estimated equation is a measure of the size of financial activity based either on the balance sheet of banks or the proportion of the total work force employed in the financial sector. The explanatory variables are chosen in an ad-hoc manner and are added or subtracted from the equation according to their statistical significance. This "general to specific" method (Hendry, 1980) is a common

[2] This study is analysed in details in this thesis because it highlights the main problems involved in examining empirically the location of financial activity. Furthermore, this study makes use of a very large list of dependent and independent variables and applies various econometric techniques to several data sets.

characteristic of empirical studies dealing with financial centres. The following list of independent variables are chosen to explain the level of financial activity: Income per capita, imports, exports, saving rate, total debt, foreign debt, investment abroad, foreign investment, reserve ratio, and an offshore dummy.[3]

GDP per capita is included as a proxy for economic development in order to test for the hypothesis that more developed countries tend to have higher levels of financial activity. Imports are included to account for the increase in demand for financial services in connection with import activity. Import activity involves the provision of different financial services such as the purchase of foreign exchange and the extension of letters of credit and hence higher level of imports are likely to be associated with higher levels of financial activity. The same reasoning also applies to exports. Reserve requirements were included to test for the hypothesis that countries with lower reserve requirements tend to attract larger volumes of financial activity while an offshore dummy[4] was used to test for the hypothesis that countries with lower tax requirements tend to attract larger volumes of financial activity.[5]

Using cross sectional analysis at the national level, the estimates are consistent with the above hypotheses, except for reserve requirements where the coefficient is insignificant, and exports where the coefficient on this variable is negative and significant at the 5% level. The authors endorse this last result and provide a very weak argument to justify it; an example of how the empirical model is dictating the theoretical content. The authors argue that exporters tend to borrow in the markets they

[3] Countries were not selected according to any criterion and it seems that the authors' choice of countries was subject to availability of data.
[4] The method used to construct the offshore dummy is not explained in their paper.
[5] As to the rest of the explanatory variables, it is not clear why they have been included in estimation.

export to keep their payments in the same currency which affects adversely the level of financial activity in the "home" country.[6]

When applying the same equation to time series analysis for the US (1900-84), UK and (1960-84) and Canada (1964-84), the authors obtain similar results, except for reserve requirements which seems to have a depressing impact on the level of financial activity in the US and Canada.[7]

When applying the same equation to time series-cross section analysis[8], the authors obtain quite different results. The coefficient on GDP becomes negative but insignificant. In addition, the coefficient on investment abroad becomes significant at the 1% level. When the percentage of the labour force is used as a dependent variable, the coefficient on GDP becomes positive and highly significant; both the coefficients on exports and imports become insignificant; the coefficient on saving rate becomes positive and significant at the 5% level. Total debt carries a negative sign and is significant at the 5% level and investment abroad, foreign investment, and portfolio investment[9] all carry positive signs and are significant at the 5% level. [10]

Using cross sectional analysis and employing data at the state level (50 US states),[11] the authors add two variables to the original equation: corporate taxes and the number

[6] Because imports and exports are usually highly correlated in most countries, it could be the case that the variable imports is capturing the effect of the variable exports. An alternative is not to include both of the variables in the same equation and use one variable at a time.
[7] This might suggest that cross sectional analysis may not reveal the impact of the regulatory environment on the level of financial activity.
[8] Data was only available for 16 OECD countries over the period 1975-1984.
[9] This variable is used for the first time in estimation.
[10] These results clearly show that the choice of the dependent variable is important in the estimation. Various measures of the size of financial activity can produce completely different results.
[11] The dependent variable used in this equation is total financial assets of all banks and near banks. No justification is given for the use of this variable.

of US multinational headquarters. The coefficient on the number of multinational corporations is positive and highly significant indicating that banks tend to cluster around headquarters of big companies. The coefficient on the corporate tax is negative but insignificant. The coefficients on personal income, imports and exports are as expected.[12] When data at the city level are used, further variables are included in the estimation. The concentration of banking system is added first. This variable has a positive coefficient. The authors do not explain the rationale for the choice of this variable or why banking concentration should have a positive impact on the level of financial activity. Time zone is another variable added to the equation.[13] The coefficient on this variable is positive and highly significant implying that time zone is very important determinant of financial activity. Finally, the authors include a variable to capture the age of the city. The coefficient on this variable is insignificant implying that " historical accident does not seem to be a determinant of financial activity."[14]

Despite these mixed results, the authors conclude that " it would seem that there is little else other than domestic income, foreign trade and the location of corporate headquarters that is relevant for the development of financial centres". The study's conclusions may have some theoretical relevance, but unfortunately these are not based on the model's estimates. In fact, the mixed empirical results make it very difficult to draw any firm conclusions. First, the dependent variable varies from one equation to another (foreign assets, total assets of banks and near banks, total assets of banks, percentage of the labour force employed in the financial sector). Different dependent variables produced different results. The same applies to the selection of

[12] The rest of the explanatory variables just disappear from the estimated equation.
[13] Time Zone is measured by some strange ratio of "assets to total number of assets within the time zone in which the city falls. "

explanatory variables where the choice of the explanatory variables is completely ad-hoc. Some variables are dropped from the equation, while others are added without the authors providing any explanation for their inclusion (for instance the concentration of banking in a country or personal income). Most importantly, the empirical results are not informative and the authors' conclusions about the main factors responsible for the emergence of a city as a financial centre are not completely based on the results of the estimated equations. Although they emphasise the importance of domestic income, the coefficient on GDP was insignificant in many specifications and in some specifications it was negative. On the other hand, despite the fact that reserve requirements were significant in explaining the level of financial activity in many specifications, the authors disregard this variable as being not important.

A more consistent study that examines the determinants of competitiveness of financial centres is that of Choi, Tschoegl and Yu (1986). In their paper, the authors examine the location pattern of the offices of the world's 300 largest banks in fourteen financial centres. Choi et al (1986) argue that banks would establish in those centres that provide them with profitable opportunities. There are two main sources for banks' profits: " First, there are those activities which the centre provides a convenient location, but which are independent of the presence or absence of other banks. Second there are the activities which are a consequence of agglomeration of institutions" (p. 52). By the first source, the authors refer mainly to trade and foreign flows that are expected to increase the demand for banking services. Because centres are the host for multinational headquarters and major points of distribution, they create larger a demand for banking services. These benefits can be obtained by the bank irrespective

[14] It is quite interesting to notice the willingness of the authors to make such a strong conclusion based on this result, especially that the variable used to capture the historical character is unsatisfactory.

of the existence of a large number of other banks. The second source of profit arises because the agglomeration of banks activates the interbank markets which are profitable for financial institutions. Furthermore, agglomeration can increase the market size by reducing buyers' search costs. Thus, banks would have the incentive to locate in areas with a large number of banks.

Two equations are estimated (1970 and 1980) using both OLS and non-linear weighted least square (NLWLS).[15] The dependent variable used in the equation is the number of offices located in centre j from banks headquartered in centre i. This variable can be considered as a measure of competitiveness since it reflects the ability of a centre to attract large number of banks. The authors include the following list of independent variables. The number of banks that are in centre j from other centres other than centre *i*. This variable is expected to capture the benefits of agglomeration. As expected, the coefficient on the variable is positive and significant implying that centres with already large number of banks are likely to attract more banks.[16] Another variable, which reflects the potential of each centre to send offices abroad, is also included. A centre can not establish more offices abroad than the number of headquarters in the centre. This variable has a positive coefficient implying that centres with more headquarters tend to establish more offices abroad. Finally, similar to the arguments proposed in the foreign direct investment literature, longer distances are expected to increase the costs for banks moving abroad. On the other hand, the establishment of local offices abroad may reduce operational costs; the costs involved in the extension of a loan to a firm abroad are reduced if the bank has an office abroad. Therefore, banks tend to establish

[15] The authors claim that NLWLS technique achieves better results when dealing with count data. However, the results do not differ much between OLS and NWLS.

local offices in more distant centres. The airline distance between the centres was used to proxy for this effect. The estimates give some, but weak support to the latter hypothesis for the coefficient on distance is positive but not significant in most of the equations.[17]

Choi et al (1986,1996) work is the most consistent among the few empirical studies that examine the determinants of banks' location. First of all, the authors are consistent in the choice of the dependent variable and independent variables. Second, this study pays special attention to the selection of centres. In other words, financial centres are not selected subject to availability of data, instead the selection is based on Reed's study (1981), which aims at identifying the major centres of the world. Examining the location of offices among similar centres limits the effect of variations in factors that can not be accounted for explicitly in empirical models such as efficient infrastructure and stable legal, regulatory and political environment. This study, however, suffers from two major shortcomings. First, it does not examine the impact of trade and foreign direct investment on location of banks. Second, it does not make any attempt to differentiate between the various forms of physical presence (branches, subsidiaries, representative offices).

Heinkel and Levi's (1992) treatment of banks' location is quite original and hence it is worth reporting. The study's main objective is to provide a theoretical framework that could explain the form of foreign presence (representative offices, agencies, branches

[16] In the extended version of this equation, the authors use the ratio of centre's GNP as a proxy for the attractiveness of the centre. The centre's share of GNP is also supposed to capture the agglomeration effect. As expected, the coefficient on this variable carries a significant positive coefficient.

[17] This basic model is extended to include another variables which captures the "exchange of threat" i.e. banks in centre j are establish in centre i if banks in centre i invade centre j. The coefficient on this variable is positive and highly significant indicating that banks retaliate to other banks' penetration.

or subsidiaries). The decision to establish any of these forms depends on a distinct set of factors. Heinkel and Levi (1992) criticise the previous empirical studies for not taking into account the different forms of foreign presence. More importantly, according to the authors, the previous studies do not differentiate between the various activities within the category of banking. This is highly relevant because according to their model, the number and the form of foreign presence of banks depend mainly on banking activities.

Heinkel and Levi (1992) divide banking services into three broad categories: Commercial services, merchant banking services, and participation in the money and capital markets. Commercial services consist mainly of collecting receivables for exporters back at home. Merchant banking services are mainly related to brokerage services such as arranging loans between home borrowers and host lenders. Participation in the foreign markets consists mainly of investing foreign currency booked at home and gathering information on investment opportunities in the host economy.

The forms of overseas banking are divided into four. Representative offices usually engage in commercial and merchant banking services. These offices do not handle any retail business such as accepting deposits and extending loans. These are usually established at low cost and are relatively flexible investment. Agencies are usually active participants in the money markets and foreign exchange operations. These do not handle any retail business and are more costly to establish. The branch is usually active in the wholesale deposit market and money markets and gathers information to

the parent bank. The establishment of branch involves high costs. Finally, subsidiaries act like home banks and enter into direct competition with locals.

The authors use cross section analysis to examine the factors that influence each type of foreign banks' operations. The dependent variable is the number of branches, agencies and representative offices in the US market instead of any balance sheet measure. Independent variables are selected to reflect the importance of the above functions. Commercial services are proxied by the value of the exports from the bank's home country to the US. The larger the volume of exports from the home country to the US, the higher the demand for commercial services. Merchant banking is measured by the size of claims of foreign banks' US customers on foreigners from each country. This measure includes total loans arranged by foreign banks in the US to main borrowers back at home from American residents. Participation in the money markets in the US is related to the size of the money and capital markets in the home country. Countries with larger money capital markets will tend to have larger participation in the US markets. The proxy used for the size of the capital and money markets is the stock market capitalisation of the home country.

The empirical results show that the level of exports, the size of the capital market and the amount of merchant banking activity are important determinants of the number of representative offices. The authors take this result to indicate that representative offices can engage in all these activities and hence any function can justify establishing a representative office abroad. The number of agencies, on the other hand depends, only on the level of exports and the size of capital markets. This is contrary to the expected, since agencies are known to be active in brokerage services. However, it

could be argued that offering merchant banking services does not necessarily justify establishing an agency because representative offices can perform these services. Finally, the number of branches depends only on the size of capital markets. This indicates that representative offices and agencies can perform banking activities related to exports and merchant banking activity. However, large capital market and large volume of trading requires the establishment of branches abroad.

Cross -Border Deposits

The study of the determinants of the flow of deposits can also shed some light on the competitiveness of financial centres. Financial centres compete with each other in attracting deposits and hence their competitiveness can be summarised by their ability to attract all types of deposits.[18] The following two questions need to be answered in the analysis of deposit flows. First, why investors place their deposits abroad? Second, in which locations are these funds placed? The answer to the last question can give an indication of the determinants of banks' location since banks tend to locate at places where there are inflow of deposits (Alworth and Anderson, 1992).

In their paper, Alworth and Anderson focus only on non-bank deposits.[19] The authors use cross sectional analysis to assess the relative importance of the different factors that may have an effect on the outward deposit decision and its location. [20] The dependent variable used in the equation is the level of non-bank US dollar deposits of

[18] A major limitation of this type of work is that it deals only with banks and ignores completely the role of financial markets and the growing importance of securitisation. However, as indicated above, these types of studies can prove very useful in the analysis of offshore centres where banking activities are still dominant.

[19] The special treatment of deposits is understandable since they constitute the main source of funds for banks (Grilli, 1989).

[20] The authors discuss an array of factors that may be responsible for outward position of deposits, but were not able to include all of them in the estimated equation for some unspecified reason.

country i in centre j. [21] According to the authors, the determinants of the location of deposits should give us an indication of where banks tend to locate since " many of the factors that are of importance to non banks in choosing a deposit location are relevant for banks' location decision as well. Indeed, banks may locate where deposits tend to accrue" (p.118).

The outflow of deposits from country i to centre j depends on the number of banks of origin i that are in centre j. However, the number of banks located in centre j from country i also depends on the flow of deposits. Thus, the causation can be reversed. In order to avoid this problem, the authors estimate an equation in the number of banks first and then use the fitted values to estimate the original equation. The results show that higher claims of centre j on non bank entities of country i gives an incentive for banks from country i to locate in centre j. Second, countries with higher GNP tend to establish more banks in the centre. Third, the decision to establish abroad also depends on the number of banks that already exists in the centre. Fourth, the corporate tax is highly significant indicating that banks tend to locate in those centres where the corporate tax is lower.[22]

The original equation, which uses non-bank deposits from country i to centre j as a dependent variable, is estimated for the same years. Mostly bilateral trade, the number of home banks that are located in the centre, and GDP of the home country explains the outflow/location of deposits. The major determinants of the attractiveness of a

[21] The dependent variable is the non-bank US dollar deposits of 17 industrial countries which have banks located in twenty-four centres. The estimation was carried for the following years: 1983, 1986, and 1990. The data is obtained from the BIS.

[22] Coefficients on the bank secrecy and turnover ratio are insignificant and coefficients on bilateral trade and GNP surprisingly change sign from one year to another. Other factors such a withholding tax rates on dividends, the level of stock market capitalisation, and reserve requirement were dropped from the equation since they are statistically insignificant.

centre are the depth of its financial markets and its political and macroeconomic stability. Reserve requirements in the centre have a negative influence on the volume of deposits attracted by a centre. Tax and regulatory measures can also affect positively the volume of deposits in a location.

Grilli (1989) estimates a similar equation, but his main focus is on the impact of regulatory and institutional factors on the competitiveness of a centre. Grilli divides these factors into three groups: Capital controls, withholding taxes, and secrecy. Capital control affects the outflow and inflow of deposits; withholding taxes affect the after rate of return on deposits; and secrecy provides customers with confidentiality. The dependent variable in the estimated equation is the stock of non-resident deposits in banks of country i, both bank and non-bank deposits. This distinction is important because according to the author these two types of deposits react differently to incentives and hence should be analysed separately. The list of explanatory variables used for the estimation of both equations is the same and it consists of the following variables: Country's contribution to total OECD output which is used to capture the "thick market externality " effect; withholding tax rates on interest; withholding tax rates on dividend income; and two dummy variables for capital inflow and capital outflow restrictions are used to capture the effect of regulatory and institutional factors mentioned previously.[23]

Consistent with the previous study, the results show that for non-bank deposits, withholding taxes and secrecy are the most important factors in determining the location of deposits. For interbank deposits on the other hand, it seems that GNP

[23] Panel Data technique was used for 10 OECD countries over the period 1972-1985.

which is expected to capture agglomeration benefits, is the most decisive factor in explaining its level.

Causes for bank expansion

The emergence and competitiveness of financial centres are directly related to their ability to attract a large number of foreign banks or other financial institutions. Hence, examining the factors responsible for the multinationality of banks can shed some light on the emergence of financial centres. A recent study by Goldberg and Johnson (1990) examines the determinants of US banking expansion abroad using national data from 22 countries. Two equations were estimated: An asset equation model which uses the assets of US foreign branches as a dependent variable and a branch equation which uses the number of US branches abroad as a dependent variable. A regulatory variable was included in the equation in order to test the hypothesis that the less restrictive the regulatory environment, the larger the US presence would be, both measured in total assets and in the number of branches. Both empirical models provide support for this hypothesis. Foreign direct investment is included in the equation in order to test the hypothesis that banks move abroad in order to service their customers. This is supported by the asset equation but not by the branch equation where the coefficient on FDI is significantly negative. The authors argue that it might be the case that larger foreign presence is required to service multinationals and that " smaller bank presence (i.e. a branch) is not positively affected by this aspect of banking business." The coefficient on ratio of exports to GNP is positive and significant in both equations. Population was included in the equation to test for the hypothesis that larger populations are associated with a larger number of potential customers which encourage banks to expand their cross-border business abroad. This hypothesis is

supported by the empirical results. Income per capita is included in the equation in order to test the hypothesis that banks tend to have more offices in developed areas. The empirical results support this hypothesis in case of branches but not in the case of total assets. Domestic deposits (measure of the size of the domestic banking activity) is included in the equation in order to test the hypothesis that countries with higher level of domestic deposits are more likely to satisfy the needs of their local customers and hence they do not require the services of foreign banks. In addition, foreign banks may find it less profitable to operate in markets already controlled by domestic banks. The final variable included in the equation is the exchange rate. The coefficient on exchange rate is insignificant in both equations indicating that exchange rate is not an important factor in explaining the expansion of US banks abroad.

Conclusion

The review of the literature shows clearly that existing empirical work on financial centres is very broad and hence it is not possible to reach definite conclusions regarding the major determinants of competitiveness of financial centres. The lack of uniformity across studies is reflected in three important aspects. The first aspect is related to the choice of the dependent variable. Many measures of competitiveness have been suggested in the literature. Table I below, shows the list of dependent variables used in these empirical studies. The selection of dependent variable is important because the results differ from one equation to another according to the dependent variable being used. For instance, the factors that explain the number of banks in a certain location are different from those that determine the level of cross border banking. Furthermore, because various measures of competitiveness are used, there is no basis for comparison between the different studies and as such the empirical

literature is sometimes uninformative on the major factors that affect the size of the financial activity or the number of banks in a location. Hence, in dealing with financial centres, special attention should be given to the choice of the dependent variable. What exactly reflects the attractiveness of a certain centre? Is it its ability to attract large number of banks or higher levels of financial activity ? Or are these measures highly correlated? Furthermore, should we use different set of explanatory variables for each equation? Without addressing such questions, the empirical literature is likely to remain uninformative.

Table 6.1 – List of Dependent Variables Used to Measure Competitiveness of Financial Centres

A. Size of Financial Assets	
Domestic and Foreign Banks' external assets	Goldberg, Helsley, Levi (1989)
Domestic and external assets of banks	Grosse and Goldberg (1991), Goldberg et al (1989)
Total assets of foreign Branches	Goldberg and Johnson (1990)
Total deposits of foreign banks	Goldberg and Saunders (1981)
B. Number of employees in foreign banks or proportion of total work force employed in the financial sector	Fisher and Molyneux (1996) Goldberg et al (1989)
C. Number of Banks	
Number of foreign bank offices	Choi et al (1986); Grosse and Goldberg (1991)
Number of representative offices	Heinkel and Levi (1992)
Number of foreign agencies	Heinkel and Levi (1992)
Number of foreign branches	Heinkel and Levi (1992) ; Goldberg and Johnson (1990)
Number of foreign Subsidiaries	Heinkel and Levi (1992)
D. Cross Border Deposits	
Non-bank cross-border deposits	Grilli (1989); Alworth et al (1992)
Interbank cross-border deposits	Grilli (1989)

The second aspect is related to the choice of explanatory variables. These studies have identified many factors that can explain the level of financial activity or the number of banks in a certain location. Table 2 below summarises the most widely used explanatory variables. Each of these explanatory variables tests for a certain hypothesis. However, in some of the reviewed studies, variables were included in the

equation without providing any explanation for their selection. More importantly, the impact of explanatory variables varies from one study to another and hence one can not reach definite conclusions regarding their impact on the levels of financial activity or number of banks. The only variable that seems to be significant in most equations is the volume of trade. However, different measures of trade resulted in different estimates. For instance, in Goldberg et al's study (1989), import activity was the main determinant of the level of financial activity while exports did not have any significant effect. In Hultman and Mcgee's study (1989), it is the other way around. Also surprising is that the empirical results are leading and suggesting the theoretical content. Hence, if the sign of the coefficient on a variables is " wrong" or unexpected, the authors do not doubt the quality of their data or question the problems involved in estimation. Instead, the authors endorse the result and try to provide a justification for the unexpected sign. Consequently, a number of weak arguments were provided in order to justify for the empirical models' results.

Table 6.2 – List of Explanatory Variables used to Explain Centre's Competitiveness

Economic and structural variables		Regulatory Variables	Other Variables
GDP	Concentration of the Banking System	Capital Controls	Political and Economic Stability
Imports	Bank's price earning ratio	Taxation	Age of Cities
Exports	Stock Market Capitalisation rate	Secrecy	Time zone
Saving Rate	Stock market Turnover Ratio	Operational and entry Restrictions	
Total Debt	The number of banks	Reserve requirements	
Foreign Debt	The location of Headquarters		
Inward and Outward Foreign Direct Investment	The size of the financial sector		
Portfolio Investment	Agglomeration effects, Positive externalities		
Exchange Rate	Geographic Distances		
Eurodollar Interest Rate	Population		

The third aspect is related to the selection of countries. Countries that are included in the analysis should be selected according to a criterion clearly identified. This is absent in most empirical studies. For instance, although Goldberg et al's (1989) study is concerned with international financial centres, the authors do not identify any criterion for the selection of these centres and hence countries like Argentina, Venezuela and Yugoslavia were included in estimation. Furthermore, most empirical studies tend to treat all financial centres alike and make no distinction between international financial centres and banking centres. This is quite restrictive since the factors that determine the competitiveness of international financial centres differ from those that determine the competitiveness of banking centres.

There are other problems of estimation that are related to the complexity of analysis of financial centres. Many of the variables that explain the competitiveness of financial centres are qualitative in nature such as political stability, time zone, historical role, age and regulatory variables (capital controls, taxation, and secrecy). Problems of estimation arise because of the difficulties involved in transforming these qualitative variables into quantitative ones. Trusting the empirical result means trusting the ability of the authors to transform successfully these qualitative variables into measurable ones. Some of these studies were convincing, others unfortunately were not and hence their results should be interpreted with caution.

It should be emphasised that many of the shortcomings mentioned above arise due to data limitations. However, attributing all problems to unavailability of data is quite misleading. It should be recognised that few problems arise due to authors' inconsistent approach in estimation. The next sections try to address few of these

problems and provide an alternative specification which we think is more adequate than the ones found in the existing empirical literature.

6.3 An Alternative Empirical Specification

In this chapter, an alternative empirical model to test the major competitiveness of financial centres is examined. The method used in this chapter differs from the existing empirical studies in four aspects. First, the selection of countries included in the regression analysis is not based on availability of data, but according to a specified criterion. That is only countries with diverse financial markets are included. This chapter develops an index of diversity of financial markets which can be used to differentiate between the level of complexity of various financial systems. Second, the constructed index is used in estimation to examine the impact of the diversity of financial markets on banks' location. The inclusion of this index is very important because it is precisely the diversity of financial markets that distinguishes a financial centre from other cities. Third, this chapter differentiates between the various forms of physical presence. We expect the impact of the explanatory variables to be different across branches, subsidiaries, and representative offices. Finally, this chapter utilises more than one econometric technique (linear regression and also probit and logit estimates). Because of the nature of the hypothesis being tested, it would be more meaningful to examine the impact of explanatory variables on the probability that a bank would establish in a certain centre. The probit and logit models allow us to carry out such an exercise. Furthermore, the adoption of different econometric techniques with different assumptions can increase our confidence in the obtained results.

6.3.1 The Selection of Centres

Our approach pays special attention to the selection of centres which are chosen according to very specific criterion: the diversity and size of their financial markets. Our analysis is limited only to countries with highly developed and complex financial structure. The differentiation among countries based on their financial structure has many advantages. As discussed in chapter 2, the multinationalisation of banks took the form of establishing overseas offices all over the world and not only in financial centres. Since we are interested in examining the major factors responsible for banks to locate in financial centres, we limit our sample to financial centres only. Including financial centres and other cities in the sample can result in a biased sample towards the latter. Furthermore, because we are dealing with centres with similar features, it is possible to control for factors such as variations in political stability or major differences in the level of complexity of physical infrastructure. All the centres selected are characterised by a stable political, legal, and regulatory environment and an advanced telecommunication and information technology infrastructure. Finally, this distinction enables us to examine the impact of diversity of financial markets on the trade of bank offices. Controlling for bilateral trade and FDI between centres, a positive coefficient on the index of diversity suggests that banks may still decide to locate in major financial centres in order to participate in the centre's financial markets. In fact, it is this particular feature in addition to existence of agglomeration economies what characterise a financial centre (Brealey and Kaplanis, 1996).

Very few countries have been successful in diversifying their financial structure and as such it is possible to construct a diversity index only for a limited number of countries,

mainly developed countries. [24] The index constructed for financial market diversity is based on the activity in three markets: the foreign exchange market, the derivative market, and the stock market. [25] In each market, data on market capitalisation and turnover are collected. The level of market capitalisation or turnover instead of a relative variable (relative to GDP or exports) is used because banks are likely to be more interested in the absolute size of the market rather than its relative size. In financial markets such as the foreign exchange market, a meaningful measure of market size is not available and hence the index would only be capturing the liquidity of that market. The construction of the index follows the method suggested by Levine and Zervos (1995) which consists of subtracting the actual turnover of each individual market from the group average and then dividing the difference by the group average.[26] This index allows us to rank centres according to their importance in a particular activity.

The Foreign Exchange Market

Table 6.3 reports the daily averages of foreign exchange market turnover in 24 countries in April 1995. Data include spot, outright forwards and foreign exchange swap activity. The INDEX FX shows that UK is by far the most important trading centre for foreign exchange in the world, followed by the United States and Japan.

[24] The countries included in the derivation of the index are those suggested by the BIS. The BIS collects data only on centres with considerable amount of foreign exchange and derivative activity and hence it is likely to cover the global market activity. The list of countries are provided in the table 6.3.

[25] In principle, the diversity index should also include Eurobond market activity. However, many problems arise when it comes to providing data on bond market activity. First, countries have different methods in collecting data on turnover of bonds and hence figures are not comparable. Second, even if data were comparable, turnover bond data usually do not include over the counter trade activity. This limits the usefulness of comparison across centres especially that the bulk of trade occurs over the counter. The only

[26] For instance the index for the foreign exchange market would be equal to = (Actual turnover – Group Average) / Group average.

Other important centres for foreign exchange trading are Hong Kong, Singapore, Switzerland, Germany and France.

6.3 – The Foreign Exchange Turnover Index 1995 [1]

Country	Amount [2]	Share (%)	INDEX FX
United Kingdom	463.8	30	6.73
United States	244.4	16	3.07
Japan	161.3	10	1.69
Singapore	105.4	7	0.76
Hong Kong	90.2	6	0.50
Switzerland	86.5	6	0.44
Germany	76.2	5	0.27
France	58.0	4	-0.03
Denmark	30.5	2	-0.49
Canada	29.8	2	-0.50
Australia	29.0	3	-0.52
Belgium	28.1	2	-0.53
Netherlands	25.5	2	-0.58
Italy	23.2	1	-0.61
Sweden	19.9	1	-0.67
Luxembourg	19.1	1	-0.68
Spain	18.3	1	-0.70
Austria	13.3	1	-0.78
Norway	7.6	0	-0.87
New Zealand	7.1	0	-0.88
Finland	5.3	0	-0.91
South Africa	5.0	0	-0.92
Ireland	4.9	0	-0.92
Greece	3.3	0	-0.95
Bahrain	3.1	0	-0.95
Portugal	2.4	0	-0.96

1. Based on average daily turnover in the Global Foreign Exchange Market
2. In billion of US dollars, April 1995
Source: BIS (1998) " Central Bank Survey of Foreign Exchange and Derivatives Market Activity in April 1998: Preliminary Global Data", BIS Press Release

The Derivatives markets

Table 6.4 reports daily averages of derivative market activity and the size of that market. The data include OTC derivative activity for two main categories: Foreign exchange derivative instruments and single currency interest rate derivative instruments. The INDEX DER reveals similar conclusions where United Kingdom, USA, and Japan capture most of OTC derivative market activity. Other important centres are France, Singapore, and Germany.

6.4 - Over-the-counter Derivatives Markets Index 1995[1]

Country	Notional Amounts[2]	Share	INDEX DER
United Kingdom	73.8	27	6.12
United States	53.2	20	4.13
Japan	32.8	12	2.16
France	22.3	8	1.15
Singapore	18.1	7	0.75
Germany	13.8	5	0.33
Belgium	6.2	2	-0.40
Canada	5.3	2	-0.49
Netherlands	5.2	2	-0.50
Switzerland	4.4	2	-0.58
Hong Kong	4.3	2	-0.59
Bahrain	4.1	2	-0.60
Denmark	3.9	1	-0.62
Australia	3.8	1	-0.63
Spain	3.6	1	-0.65
Italy	2.4	1	-0.77
Austria	2.3	1	-0.78
Sweden	2.3	1	-0.78
Luxembourg	2.2	1	-0.79
Finland	1.8	1	-0.83
Ireland	1.5	1	-0.86
Norway	1.5	1	-0.86
South Africa	0.4	0	-0.96
New Zealand	0.2	0	-0.98
Greece	0.1	0	-0.99
Portugal	0.1	0	-0.99

1. Based on the turnover and size of the OTC Derivatives Market
2. Daily average in notional amounts in billion of dollars
Source: BIS (1998) " Central Bank Survey of Foreign Exchange and Derivatives Market Activity in April 1998: Preliminary Global Data", BIS Press Release

The stock Market

A similar index is constructed for the stock market (Table 6.5). This index incorporates information both on the size of the stock market and value of share trading. According to this index, the US is the most important centre both in terms of market capitalisation and share trading value, followed by Japan, United Kingdom, France Germany and Canada. Other important centres are Netherlands, Hong Kong and Australia.

6.5 – Stock Market Index 1995

Country	Stock market capitalisation (end of 1995)	Value of share trading (end of 1995)	INDEX CAP	INDEX TURN	INDEX STOCK
United States	6917.70	3082.92	9.58	9.31	9.45
Japan	3667.29	884.00	4.61	1.96	3.28
United Kingdom	1346.64	1153.22	1.06	2.86	1.96
Germany	577.36	593.94	-0.12	0.99	0.43
Switzerland	398.09	340.11	-0.39	0.14	-0.13
France	499.99	213.16	-0.24	-0.29	-0.26
Canada	366.34	151.56	-0.44	-0.49	-0.47
Netherlands	286.65	125.68	-0.56	-0.58	-0.57
Hong Kong	303.70	95.82	-0.54	-0.68	-0.61
Australia	244.34	98.31	-0.63	-0.67	-0.65
Italy	209.52	87.12	-0.68	-0.71	-0.69
Sweden	172.55	94.21	-0.74	-0.68	-0.71
Singapore	150.96	63.98	-0.77	-0.79	-0.78
Spain	150.91	54.03	-0.77	-0.82	-0.79
Belgium	101.75	18.34	-0.84	-0.94	-0.89
Denmark	57.69	28.34	-0.91	-0.91	-0.91
Norway	44.59	24.93	-0.93	-0.92	-0.92
Finland	44.14	19.21	-0.93	-0.94	-0.93
Austria	32.51	13.36	-0.95	-0.96	-0.95
Ireland	25.84	13.33	-0.96	-0.96	-0.96
New Zealand	31.95	8.72	-0.95	-0.97	-0.96
Luxembourg	30.44	0.49	-0.95	-1.00	-0.98
Greece	15.88	6.08	-0.98	-0.98	-0.98
Portugal	18.36	4.24	-0.97	-0.99	-0.98

Source: IFC, Emerging Stock Market Factbook, 1996

The diversity index

The diversity index is a non-weighted average of INDEX FX, INDEX DER and INDEX STOCK.[27] According to this overall index, United States, United Kingdom, Japan, Germany, France, Singapore, Switzerland and Hong Kong are the world's largest financial centres. Initially, data were collected for the largest fifteen financial centres. However, due to data unavailability, Denmark and Belgium were dropped from the equation which leaves us with thirteen centres. These are: USA, Canada, Australia, Japan, Hong Kong, Singapore, Spain, Italy, UK, France, Netherlands,

[27] The diversity index can be extended to include banking centres' external deposits and assets. Given that cross-border deposit and lending activity are highly correlated with other types of banking activities, the exclusion of these two variables in the diversity index is unlikely to have an impact on the empirical results or on the ranking of banking centres.

Germany, and Switzerland. Given that we collect bilateral data on each series, our sample consists of 156 observations.

6.6 – The Diversity Index 1995

Country	Overall INDEX (1995)
United States	5.55
United Kingdom	4.94
Japan	2.38
Germany	0.35
France	0.29
Singapore	0.24
Switzerland	-0.09
Hong Kong	-0.23
Canada	-0.49
Netherlands	-0.55
Australia	-0.60
Belgium	-0.61
Denmark	-0.67
Italy	-0.69
Spain	-0.71
Sweden	-0.72
Luxembourg	-0.82
Austria	-0.84
Norway	-0.88
Finland	-0.89
Ireland	-0.91
New Zealand	-0.94
Greece	-0.97
Portugal	-0.98

Notes: The overall index is as a non-weighted average of INDEX FX, INDEX DER and INDEX STOCK.

The empirical literature on finance and development has suggested a number of measures of financial development based on stock market and banking development (Zervos and Levine, 1995; Demirguc-Kunt and Levine, 1995). It would be interesting to compare our index of diversity and the various indices suggested in the literature. After all, our index of diversity also reflects the level of development of the financial system. Demirguc-Kunt and Levine (1995) construct a financial intermediary index which combines averages of M3/GDP (i.e. liquid liabilities of the financial intermediaries divided by GDP) and the ratio of domestic credit to private firms divided by GDP calculated over the 1976-1993 period. Since our index does not capture any measure of banking development, we expect to find a low correlation between our index and the financial intermediary index. In fact, a positive correlation between these two indices was found but the correlation coefficient is relatively low (0.40). The index which is likely to be more correlated with our over all index is stock

market development index constructed by Demirgu-Kunt and Levine (1995), which is the average of market capitalisation, total value traded to GDP and turnover. As expected, we find a high and positive significant correlation coefficient (0.62) between these two indices. This suggests that while our index is correlated with various indicators of financial development, the diversity index captures different features of financial market development.

6.3.2 Measure of Competitiveness of Financial Centres

This chapter has emphasised in more than one place that special attention should be given to the choice of the dependent variable. The choice of one dependent variable over the other can produce different results. For instance, Goldberg and Johnson's study (1991) which uses both number of bank offices and foreign assets as dependent variables reached interesting conclusions concerning foreign direct investment. According to this study, foreign direct investment has a positive impact on the level of cross border assets, but does not seem to affect the number of branches in a location. On the other hand, trade activity has a positive impact both on the number of offices and level of cross border assets. Because of such differences, it is important to examine the competitiveness of banking centres making use of both dependent variables.

Unfortunately, data do not permit us to carry out this exercise and hence we focus on one measure of competitiveness only: the number of foreign offices of the 250 largest banks in the world.[28] The number of offices is chosen for a number of reasons. Obviously, the first reason has to do with data limitations. The Bank for International Settlements (BIS) publishes data on the position of reporting banks (according to its nationality) against individual countries in its semi-annual report. This set of data

would have served the purpose of the empirical model. Unfortunately, data on the external position of reporting banks against countries within the reporting area are not available. For instance, although the BIS publishes data on the position of German banks against Lebanon, such data are not available for German banks against France or United Kingdom or any country in the reporting area. Since this chapter deals with the location of offices in countries with relatively diversified financial markets, mainly centres in the reporting area, this data set can not be used for our purposes.

Another reason for the choice of the number of offices is that external assets of banks measures only one aspect of banks' activity: their international lending activity. This can be less binding in financial systems where banks are dominant, but not in the case of centres with highly diversified financial structure. Furthermore, using the number of offices as a dependent variable allows us to make a distinction between the different forms of physical presence in order to examine the impact of explanatory variables on the number of branches, subsidiaries and representative offices.[29]

Table 6.7 below summarises data on the location of overseas offices of the world's largest 250 banks in the end of 1996. Notice the importance of United States, United Kingdom, Hong Kong and Singapore as host countries. On the other hand, Japanese banks have the largest number of offices abroad, followed by Germany and France. Although our data refers only to the largest 250 banks in the world, this pattern in re-

[28] Offices include branches, subsidiaries, and representative offices.
[29] This measure has its own drawbacks. One major drawback is that it treats all offices alike regardless of their size or their added. One way to overcome this problem is to use employment in foreign offices as the dependent variable (Brealey and Kaplanis, 1996). However, data limitations do not permit such an exercise.

confirmed by Brealey and Kaplanis data set (1996) which includes data on the location of overseas offices of world's largest 1000 banks.[30]

Table 6.7 - Location of overseas offices of world's largest 250 banks in 1996

	Host*													
Parent*	**USA**	**Can**	**Aust**	**Japan**	**HK**	**Sing**	**Spain**	**Italy**	**UK**	**France**	**Nether**	**Germany**	**Swit**	***Total***
USA		9	11	16	17	12	10	11	22	12	3	9	8	140
Canada	12		3	4	9	9	0	2	9	2	3	3	3	59
Australia	4	0		4	6	5	0	0	5	1	0	1	1	27
Japan	72	16	30		74	39	8	10	60	13	8	28	23	381
Hong Kong	3	0	0	1		0	0	0	1	0	0	1	0	6
Singapore	0	3	2	2	4		0	0	2	0	0	0	0	13
Spain	7	1	1	4	3	2		5	6	7	2	5	9	52
Italy	17	3	4	6	7	7	8		12	11	3	12	3	93
UK	10	2	7	7	9	6	4	5		6	3	6	4	69
France	19	3	5	13	15	11	14	15	18		6	13	9	141
Netherlands	2	0	1	2	3	3	2	3	3	3		1	2	25
Germany	18	5	6	14	16	17	11	14	14	19	16		14	164
Switzerland	9	4	4	9	8	8	5	3	3	2	2	4		61
Total	173	46	74	82	171	119	62	68	155	76	46	83	76	1231

*Rows show parent countries; columns show host countries.

Source: Banker Almanac CD-ROM (1997)

6.3.3 Hypotheses

Explanatory variables are selected to test a number of hypotheses suggested in the last two chapters. The list of explanatory variables consists of the following: Foreign direct investment, trade activity, the size of the country of origin, differences in the tax and regulatory structure. In addition, the existing number of banks in a centre and a centre's index of diversity are included to capture agglomeration benefits offered by financial centres and the desire of banks to locate in a centre to participate in a centre's financial markets. Each of these variables and the associated hypothesis are discussed below.

[30] In fact, our series of foreign offices is highly correlated (0.90) with Brealey and Kaplanis series. However, the latter series is not used in the empirical analysis because it does not contain separate information on the number of subsidiaries, branches and representative offices and instead all types of offices are grouped together.

Foreign direct investment and trade activity

The empirical evidence suggests that trade activity is the major determinant of international banking activity. Both export and import activity generates demand for banking services. For instance, import activity usually involves the purchase of foreign exchange or the extension of letters of credit to importers and exporters. Most importantly, payments related to international trade activity are usually settled through banks. Such activities provide banks with an important source of income in terms of fees and interest payments. Despite the fact that such transactions can be settled through correspondent banks abroad, "home" banks may decide to internalise "external" transactions by establishing offices in locations where there is substantial volume of trade with the home economy.

Additional business opportunities also arise in countries or regions which attract large volume flows of foreign direct investment. Foreign direct investment creates potential sources for deposits, loans, and management fees. Hence, it is expected for foreign direct investment to play a role in the determination of the location of banks. In particular, foreign direct investment from country i to country j is likely to push some banks in countries i to locate abroad in region j. Notice that this hypothesis is slightly different from the "follow the clientele" hypothesis which suggests that banks tend to locate near their main multinational borrowers. That is to say that if a multinational corporation moves abroad, then the bank that used to service its financial needs domestically would have the incentive to move abroad in an attempt to protect its market share from host banks and foreign banks operating in the new market. It is important to note that in order to test for this hypothesis we require data on the number

of multinational companies from country i headquartered in country j rather than foreign direct investment between these two countries.

The tax and regulatory structure

The decision of banks to locate in other centres can also be attributed to differences in tax and regulatory structure. Table 6.8 below shows that there are great variations across centres in terms of corporate tax rates. For instance, the corporate tax rate in Germany in 1995 was 45% compared with 4-10% in the case of Switzerland. Differences in tax structures can affect banks' after tax rate of return and hence influence the location of banks. Hence, we would expect that countries would tend to establish in centres with low tax requirements. [31]

Table 6.8 – Corporate Tax Rates in Selected Financial Centres

Country	Corporate tax rate in 1995
Germany	45
Japan	38
Italy	36
United States	35
Spain	35
Netherlands	35
Australia	33
UK	33
France	33
Canada	29
Singapore	27
Hong Kong	17.5
Switzerland	4-10

Source: Coopers and Lybrand, International Tax Summaries (1996)

In addition to differences in tax requirements, variations in the regulatory structure across countries can affect a bank's decision to establish in a certain location since such variations can affect the rate of return on banking capital (Eaton, 1994; Alworth

[31] It is important to note that although differences in tax requirements have been emphasised in the previous chapter, they have been stressed in the context of tax havens and banking centres. Once the focus of analysis shifts to large economies with diversified financial markets, the impact of tax differences is expected to be less important. For instance, although the US has a relatively high corporate tax rate, banks still have the incentive to establish in the US market probably because of the size of the US market or the diversity and complexity of their financial structure. The same can be argued in the case of Japan or the UK. In other words, while it is easy to explain the rise of Cayman

et al, 1992). Table 1 in the appendix describes the major restrictions imposed on financial and capital markets (end of 1995). This table shows that despite recent movements towards financial liberalisation, many countries still impose various restrictions on financial activity. Australia has the most restrictive environment where the government still imposes various restrictions on the purchase and sale of securities and money market instruments by non-residents. Further restrictions are imposed on commercial bank and other credit institutions' transactions. France, Japan, and Spain also have relatively restrictive environment whereas United Kingdom, Switzerland, Singapore and Hong Kong and Canada have almost no restrictions on financial activity.

The size of the country of origin

The existing empirical studies suggest that larger countries of origin are likely to have more overseas bank offices abroad. Some economists have considered this evidence as an indication of existing of economies of scale (Ter Wengel, 1995). That it is say that banks in larger economies are likely to establish more foreign offices abroad because of their ability to achieve economies of scale which arise due to large demand for banking services (Arndt, 1988). Hence, the size of the economy might constitute a source for comparative advantage and could explain the pattern of trade among countries. An alternative explanation would be that larger economies usually have a large number of banks and hence are likely to establish more bank offices abroad (Choi et al, 1996). In other words, there is a mere scale effect which may not necessarily involve economies of scale. Hence, a positive coefficient on the size of the

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Islands in terms of differences in tax structure, these differences can not explain the decision of banks to locate in very large economies.

country of origin (usually measured by GDP) may not necessarily imply economies of scale, but rather a size effect.

Agglomeration benefits and greater access to financial markets

As argued in chapters 3 and 4, an important factor that affects banks' decision to locate in a certain centre is the number of banks that already exist in that centre. Various factors can explain the decision of banks to establish near each other. In addition to informational spillover that may arise due to physical proximity and direct interaction with other competitors, chapter 3 argued that under certain conditions, financial agglomeration increases financial firms' access to more specialised intermediate services, a larger skilled labour force, and more efficient infrastructure. This is expected to shift upwards the profit function of banks, other things being equal. Furthermore, some economists have argued that geographical centralisation of banks results in more efficient and active interbank markets and can expand the size of existing activities such as syndicate lending (Choi et al, 1996; Davis, 1990).

It could be argued that a large number of banks in a centre might result in greater competition which may affect banks' profitability. In a highly competitive market, attempts to increase market shares are likely to be met by fierce rivalry in the form of price undercutting and product differentiation. Furthermore, these markets are likely to entice new comers intensifying the risk of future increases in competition. Survey results and empirical evidence however suggest that despite the threat of fierce competition, banks prefer to locate near their competitors. This indicates that the benefits accrued from agglomeration offset the costs associated with intense rivalry

and competition. A positive sign on the coefficient on the number of existing banks would provide support for this argument.

There are two ways to account for this agglomeration effect in empirical models. Most studies use GDP of the centre to proxy for these agglomeration benefits (Grilli 1989, Alworth et al 1992).[32] I think however that GDP can not capture the agglomeration effects fully. For instance, although Hong Kong and Singapore have the smallest economies in the sample, they still managed to attract a large number of banks. Hence, based on the centre's GDP, agglomeration benefits in Hong Kong and Singapore are low while the large number of banks in these two centres suggest that agglomeration benefits are substantial. A more direct measure that can be used is the actual number of banks in a centre. In particular, agglomeration benefits can be captured by the number of banks from countries other than i that are in j (Choi et al 1986, 1996).[33] This variable is expected to capture the effect of agglomeration better than the mere size of the economy. Large number of banks may reflect the existence of more specialised inputs, more skilled labour force and efficient public infrastructure.

Including a variable that captures the agglomeration effect in our empirical model is essential because it allows us to examine whether banks locate in other centres to capture agglomeration benefits *after controlling for bilateral trade, foreign direct investment, size of the country of origin and differences in the regulatory and tax structures.* In fact, Brealey and Kaplanis (1996) note that countries which attract banks

[32] As Grilli argues, " large industrialised economies probably enjoy a comparative advantage in attracting financial firms from the rest of the world. Such thick market externalities explain why the size of the matters, and why the four largest international financial centres (London, New York, Tokyo, and Paris) are also the financial centres of four out of the five largest economies."

[33] Assume two countries, USA (i) and France (j), then this variables measure the total number of banks in France other than banks of US origin.

only because of their trade relations or the size of their economies should not necessarily be considered as financial centres. Instead, they define a financial centre as one which foreign banks locate in order to access the centre's financial markets. The index of diversity of financial markets can be used to capture the impact of access to large and diversified financial markets on the number of banks.

It is important to note that bank agglomeration and deeper financial markets are highly related. It is often argued in the literature that agglomeration of banks activates existing financial markets (Davis, 1990; Choi et al, 1996) although causality can also run in the opposite direction i.e. deep and diverse financial markets can attract large number of banks. It is possible to test for this hypothesis using correlation analysis. Given the above reasoning, we would expect to find a high correlation between our diversity index and number of banks in a centre. In fact, a high and positive correlation coefficient of 0.80 was found between these two series which suggests that centres with large number of banks have also the most diversified financial markets.

The number of banks in a centre and the index of diversity can in principle be used individually or jointly in the model as indicators of the existence of agglomeration benefits and access to more diversified financial markets. The use of one particular variable may shed light on the effects of existence of agglomeration economies or access to more diversified financial markets, but is unlikely to provide reliable estimates since this strategy is likely to suffer from omitted-variable bias. Joint use of both variables also entails econometric problems as these variables are highly correlated. In order to avoid this problem, we can use a summary measure of these two variables using the statistical method of principal components (Theil, 1971). This

summary measure is highly correlated with the underlying variables. This measure which we call the agglomeration-diversity index and is used in the empirical model to test for the hypothesis that after controlling for other variables, banks locate in financial centres in order to have access to deep and liquid financial markets and capture the agglomeration benefits offered by financial centres.

6.3.4 The Empirical Model

We estimate the following equation, in which the explanatory variables are lagged one period: [34]

$$NB_{ijt} = a_0 + a_1 EXP_{ijt-1} + a_2 PC_{jt-1} + a_3 LGDP_{it-1} + a_4 dR_{ijt-1} + a_5 dCt_{ij-1} + e_t$$

Where

NB_{ij} = number of bank offices from country's i parent banks to centre j

EXP_{ij} = exports of centre i to centre j

PC_j = the first principal component of number of banks and index of diversity of centre j

GDP_i = GDP of the country i

dR_{ij} = the difference in the regulatory structure between centre i and centre j

dCt_{ij} = the difference in the corporate tax between centre i and centre j

6.3.5. Data

Data were collected for the year 1995. Thirteen countries were included in estimation. Data were complete for all variables except for the FDI where figures on Singapore

[34] Data on the number of offices were collected for 1996, while data on the explanatory variables were collected for 1995. Because there may be costs and delays to opening and closing branches and subsidiaries, the number of bank offices is likely to be determined by lag economic and regulatory and tax variables (Brealey and Kaplanis, 1996). Furthermore, this specification reduces the problem of possible simultaneity.

and Hong Kong's stock of FDI were not available. Data on GDP were obtained from the *World Bank, World Development Indicators 1997*. The data on the stock of FDI were obtained from the *OECD, International Investment Statistics Yearbook*. Stocks of FDI were converted into dollars using year-end exchange rate obtained from the *IMF, International Financial Statistics*. The data on bilateral trade were obtained from *OECD, Monthly Statistics of Foreign Trade*. Data on the stock market capitalisation and turnover were obtained from *IFC, Emerging Stock Market Factbook*. Data on derivative and foreign exchange activity were obtained from the *Bank for International Settlement*. Data on corporate taxes were obtained from *Coopers and Lybrand, International Tax summaries*. Data on regulatory factors were obtained from *IMF Annual Report on Exchange Restrictions*. Finally, data on the number of offices for 1996 were collected from the *Bankers' Almanac CD-ROM*.

Two general data problems are worth reporting before presenting the empirical results. First, financial activity tends to concentrate in major cities (New York, London, Tokyo, etc.) and hence it would be more informative to examine the major determinants of the competitiveness of these cities. However, data at the city level are available only for very few cities. Using data at the national level may seem restrictive if the aim of the analysis is to examine the major determinants of New York's competitiveness as an international financial centre over time, but not necessarily in cross-section analysis for one major reason. In most countries, there is a tendency for financial activity to concentrate in one major city. Hence, data at the national level are likely to reflect primarily the financial activity of that city. This is especially true in small economies. Second, in case of some qualitative variables, data are not available at year-end. For instance, data on the regulatory and tax structure of different countries

are collected at different points in time. Furthermore, most of the data on derivative and foreign exchange are collected based on surveys performed during a particular month, while other variables are only available at year-end. This may seem to create serious estimation problems. However, these problems are not necessarily binding. For instance, indices used to capture the regulatory and tax structure of different countries do not vary much during the course of the year. Hence, even if data on the regulatory and tax structure were collected in March while a measure of financial activity is only available at year end, this does not affect the results, especially that these indices are constructed in order to rank the importance of different financial centres according to a special feature.

6.3.6 Method of Estimation

Data were grouped and the equation was estimated using OLS both in levels and logarithms. Given that there are some zeros in the dependent variable sample, taking logarithms of the dependent variable eliminates all zero cells and restricts the estimation only to cells with positive entries. To examine whether this affects the empirical results, we also apply least squares to the levels of series.

In addition to least square estimation, this chapter uses logit and probit models. The use of an alternative estimation technique yields two major benefits. First, logit and probit models are based on different assumptions from least squares; the equations are estimated using the maximum likelihood method. If these two alternative methods of estimation achieve similar results regarding the sign and the significance of coefficients, we can be more confident about the obtained results. Second, and more importantly, given the nature of the hypothesis, examining the impact of explanatory

variables on the probability of a bank establishing in a certain centre can be more meaningful than calculating mere elasticities. Probit and logit models allow us to formulate the hypothesis in terms of probabilities.

Probit and logit models are used widely in labour economics, but they are much less familiar in other fields and hence it is worth pausing for a while to describe the major features of these models. Consider the following model:

$$y^* = X\beta + \varepsilon$$

Where X is the matrix of the independent variables, β is the vector of parameters and y^* is a latent variable which is not observable. Instead, we observe a dummy variable y_i which can be defined as:

$y_i = 1$ *if* $y^* > 0$ (i.e. the bank has some form of physical presence abroad)

$y_i = 0$ (otherwise)

Estimating the equation with dummy variables on the left-hand side by OLS (known as the linear probability model) is not desirable mainly to the fact that this model does not constrain the predicted value to be between 0 and 1 (Greene, 1993; Madalla, 1983). One way to overcome this problem is to transform $X\beta$ into a probability:

$$P_i = Prob\ (y_i = 1) = F(X\beta)$$

If we denote by $1,....,m$ as the m observation such that $y_i=0$ *and* $m+1,....,n$ such as $n-m$ as the observations such that $y_i=1$ and assuming the i.i.d sampling, then likelihood function can be written as:

$$L= \Pi_{yi=1} P_i * \Pi_{yi=0} (1-P_i)$$

The model is not linear in probabilities and hence the equation has to be estimated using maximum likelihood. A distribution function or cumulative density can transform $X \beta$ to lie between zero and one. Of course, there is more than one distribution which can achieve this role and hence the results of the model depend on the choice of the distribution. One such distribution is the logistic distribution function which takes the following form: [35]

$$P_i=F(Z_i)=exp(Z_i)/(1+exp(Z_i)) \text{ where } Z_i \text{ is } X\beta$$

In the case of the logit model, it is useful to take logarithms of both sides of the ratio of P/1-P (the odd ratios) i.e. the ratio of the probability that a bank will establish in a certain location to the probability that it will not:

$$Li=Log\ Pi/1-Pi = log\ F(Zi)/1-F(Zi) = Zi= X\beta$$

The left-hand side of the equation (called the log-odd ratios) is a linear function of the explanatory variables.

6.3.7 *Empirical Results*

The empirical results are shown in the table 6.9 below. We report three types of equations according to the method of estimation being used. In type I equation, the model is estimated using linear square estimation procedure, but without taking the logarithm of the variables. Type II equation estimates the same model, but the explanatory variables are expressed in logarithms (except for PC, dCt and dR).[36] Type 3 equation is estimated using the logit procedure described above. In type 1 equation, we reject the null hypothesis of homoscedasticity (based on Goldfeld-Quandt and Breusch- Pagan tests) and hence the equation was estimated using the generalised least squares (GLS).

The table below shows that the obtained results are sensitive to the method of estimation being used. The size of the country of origin and the agglomeration benefits – diversity index are the only two explanatory variables that maintain the same sign and significance across equations. Although the coefficient on bilateral exports does not change sign, its significance varies from one equation to another. On the other hand, the sign and significance of the coefficient on differences in tax structure differ across equations. All in all, the empirical results indicate that the following explanatory variables are the major determinants of the location of offices: the size of the country of origin, the agglomeration benefit-diversity index and bilateral exports. As can be indicated from the table below, the coefficient for the size of the country of origin is significant in all the equations. Ter Wengel (1995) argues that this is evidence of the presence of economies of scale in larger economies, although as argued previously this variable could be capturing a mere scale effect. Second, the coefficient

[35] The features of the probit model are the same as those of the logit except that the normal distribution is used instead of the logistic distribution function.

for the agglomeration benefits-diversity index is highly significant in all the estimated equations indicating that banks locate abroad to capture agglomeration economies and participate in a centre's complex and developed financial markets. Third, the coefficient for exports is positive and significant in all the equations indicating that bilateral trade has an impact on the trade of banking offices.

The results also indicate that differences in the regulatory and tax structure do not affect the location of banks. This is especially true for differences in regulatory structure for the coefficient on this variable is insignificant in all of the estimated equations. Hence, we drop this variable from the equation and re-estimate the model again. As can be seen from table 6.9, dropping this variable does not alter the empirical results.[37]

[36] Notice that in type II equation, cells with zero entries are excluded from estimation.

[37] The three models perform well in explaining the major determinants of banks' location. According to the adjusted R^2, the equation in logarithms performs better than type 1 equation which does not take the logarithms of the variables. In the former equation, the explanatory variables explain 62% of the variation of trade in offices compared to 44% in the latter equation. Furthermore, using logarithms gets rid of the multicollinearity problem. Unlike OLS, there is no single measure such as R^2 for measuring goodness of fit in logit models. However, it is possible to rely on few measures to assess the general fitness of the equation: the pseudo R^2 which is based on likelihood ratios (more or less equivalent to the conventional R^2) and count R^2 which is obtained by ratio of the number of correct prediction to total number of observations. In addition, the likelihood statistic which is equivalent to the F-test in OLS regression can also be used. In our model, the pseudo R2 is 0.60, the count R2 is 0.92 (44 cases correct out of 156) and the null hypothesis of zero coefficients can be rejected at the 1% level. All these measures suggest that the logit model performs very well in explaining the major determinants of banks location.

Table 6.9 – Determinants of Location of Banking Offices in Financial Centres

Regressors [2]	*Eq1* [3] Level (GLS)	*Eq2* [4] Logs (OLS)	*Eq3* [5] Logit	*Eq1* [3] Level (GLS)	*Eq2* [4] Logs (OLS)	*Eq3* [5] Logit
Constant	1.987*	-3.09*	-21.150*	1.954*	-3.107	-21.357
	(0.343)	(0.375)	(5.916)	(0.297)	(0.375)	(5.942)
EXP_{ij}	0.040***	0.169*	0.667***	0.042***	0.168*	0.707**
	(0.02)	(0.045)	(0.419)	(0.024)	(0.045)	(0.412)
GDP_i	0.002*	0.488*	3.176*	0.002*	0.492*	3.154*
	(0.003)	(0.060)	(0.793)	(0.000)	(0.060)	(0.787)
PC_j	1.394*	0.16*	1.140*	1.387*	0.172*	1.193*
	(0.244)	(0.039)	(0.539)	(0.217)	(0.038)	(0.579)
DCT_{ij}	0.031**	0.003	-0.015	0.031**	0.005	-0.028
	(0.016)	(0.004)	(0.033)	(0.013)	(0.004)	(0.351)
DR_{ij}	0.007	0.007	-0.048	—	—	—
	(0.03)	(0.007)	(0.050)			

(1) The dependent variables is the number of bank offices (subsidiaries, branches, and representative offices) from centre i to centre j. Figures in parentheses are the standard errors.

(2) GDP_i = GDP of centre i; EXP_{ij} = the value of exports from centre i to centre j; Div-Agg IND_j = the index of agglomeration benefits and participation in financial markets; DCT_{ij} = the difference of corporate tax rate between centres i and j; DR_{ij} = difference in the regulatory structure between centres i and j

(3) The equation was estimated without taking the logarithms of the variables. Both the Goldfeld-Quandt and Breusch-Pagan tests indicate the existence of heteroscedasticity and hence the equation was estimated using the generalised least squares (GLS).

(4) The equation was estimated taking the logarithms of the dependent variable, EXP_{ij} and GDP_i.

(5) The equation was estimated using logit analysis. It is important to check for heteroscedasticity in these models as the presence of this problem yields not only inefficient but also inconsistent estimates (Maddala, 1983). The null hypothesis of homoscedastic could not be rejected using the likelihood ratio (Greene 1993) and hence only the results of the homoscedastic model are presented.

* Significant at the 1% level, ** Significant 5% level, *** significant at the 10% level.

Foreign direct investment from centre i to centre j is next added to the original model. The results shown in the table below show that FDI is insignificant in all equations, indicating that foreign direct investment is not a major determinant of the number of banks.[38] One possible explanation for the performance of foreign direct investment is that the impact of FDI is likely to vary according to the dependent variable being used. For instance, FDI may have a positive impact on the level of cross border banking assets, but not necessarily on the number of bank offices (Goldberg and Johnston,

1990). It should be noted that an insignificant coefficient on FDI does not necessarily refute the "follow the clientele" hypothesis. To test for the hypothesis that banks follow their prime borrowers (mainly the MNCs), the number of MNC headquarters from country i to country j should be used instead of the stock of foreign direct investment. However, such data are not available. Hence, this result only suggests that foreign direct investment into a country does not require the establishment of banking offices in that country. This is consistent with our story that banks can service the needs of MNCs by establishing in very few established centres which are also host to a large number of MNC headquarters.

Table 6.10 – Determinants of Location of banking offices in major financial centres[1]

Regressors [2]	*Eq1*[3] Level (GLS)	*Eq2*[4] Logs (OLS)
Constant	2.625*	-2.906*
	(0.396)	(0.426)
EXPij	0.046	0.145*
	(0.003)	(0.050)
FDIij	-0.005	-0.019
	(0.003)	(0.020)
GDPi	0.002*	0.516*
	(0.000)	(0.068)
PC	1.713*	0.213*
	(0.267)	(0.041)
dCt	0.019	0.003
	(0.018)	(0.004)

Notes:
(1) The dependent variables is the number of bank offices (subsidiaries, branches, and representative offices) from centre i to centre j. Figures in parentheses are the standard errors.
(2) GDP_i = GDP of centre i; EXP_{ij} = the value of exports from centre i to centre j; FDI ij = foreign direct investment from centre i to centre j, Div-Agg IND_j = the index of agglomeration benefits and participation in financial markets; DCT_{ij} = the difference of corporate tax rate between centres i and j; DR_{ij} = difference in the regulatory structure between centres i and j.
(3) The equation was estimated without taking the logarithms of the variables.
(4) The equation was estimated taking the logarithms of the dependent variable, EXP_{ij} and GDP_i.
* Significant at the 1% level, ** Significant 5% level.

[38] We were not able to apply the logit procedure to the above specification due to non-convergence.

The results taken together suggest quite clearly that after controlling for variations in the regulatory and tax structure, the size of the country of origin and bilateral trade, banks' desire to capture agglomeration benefits and participate in larger and more diversified financial markets influences their decision to establish offices abroad. Although in principle banks can participate in other centre's financial markets at a distance, the evidence suggests that proximity to other market players still matters.

6.4 A Note on the Distinction Between Subsidiaries, Branches, and Representative Offices

In this section, we make a distinction between the various forms of banking presence. In particular, we make a distinction between subsidiaries, branches and representative offices. Heinkel and Levi's study (1992) indicates that the decision to establish each of these forms depends on a distinct set of factors. This section contributes to this literature by examining what type of bank offices are likely to be associated with access to larger markets.

In table 6.11 below, four models are reported. In the first model, the dependent variable is a dummy variable that takes the value of 1 if centre i has some type of physical presence in centre j (without making a differentiation among the various forms of physical presence) and zero otherwise. This model is similar to the one reported before but it does not include differences in corporate tax rates which were found to be insignificant. In models 2, 3 and 4, we make a distinction between subsidiaries, branches and representative offices. For instance, in model 2, the dependent variable is a dummy variable that takes the value of one if centre i has a subsidiary in centre j and zero otherwise. The list of explanatory variables is the same

in all models. Differences in tax and regulatory structure were found to be insignificant and hence are dropped from the model.

Model 1 which uses the number of bank offices as a dependent variable produces results similar to the ones obtained previously with one minor difference. In this specification, bilateral exports become significant at the 1% level instead at the 5% level. The model performs well as reflected in a high pseudo R^2 of 0.57 and high count R^2 of 0.95. The Chi-square statistics suggests that the null hypothesis of all coefficients are zero could be rejected at the 1% level.

The model in the number of subsidiaries, shows quite different results. In this specification, bilateral exports become insignificant and the agglomeration benefits – diversity index is only significant at the 10% level. These results may reflect the fact that subsidiaries act like home banks and enter into direct competition with local banks for domestic markets rather than engage in financing bilateral exports. The model in the number of subsidiaries performs poorly as reflected in the low pseudo R^2 which suggests that other determinants, mainly related to investment banking activity, should be added to explain the number of subsidiaries in a location. [39]

[39] It should be noted that this thesis is mainly aimed at identifying the major determinants of the location of bank offices in major financial centres rather than explaining the form of these offices. It is quite obvious from the above results that studying the form of presence of banks requires a somewhat different approach from the one adopted here. The alternative approach should analyse the determinants of subsidiaries, branches, and representative offices separately as each of these seem to be affected by different explanatory variables or at least the impact of these variables is not the same across equations. However, the results of the model provide some useful information on the form of bank offices.

The model in number of branches performs better than the previous model. All the explanatory variables have highly significant and correctly signed coefficients. The pseudo R^2 is relatively high and according to the count R^2 measure, the model predicts 84% of the cases correctly. The positive and highly significant coefficient on the agglomeration benefit-diversity index is consistent with Heinkel and Levi's study (1992) which shows that large capital markets and large volumes of trading are highly associated with number of branches in a location. In fact, the authors argue that participation in capital markets requires the establishment of branches in a location.

Table 6.11 - Determinants of the number of subsidiaries, branches and representative offices

	NB[1]	NSUB[2]	NBRA[3]	NOF[4]
Regressors[5]				
Constant	-20.545*	-8.204*	-7.922*	-8.475
	(5.970)	(1.736)	(0.189)	(1.550)
LEXPij	0.926*	0.409	0.418*	0.228
	(0.418)	(0.174)	(0.189)	(0.157)
	[2.524]	[1.505]	[1.519]	[1.256]
LGDPi	2.760*	0.908*	0.957*	1.022*
	(0.680)	(0.222)	(0.250)	(0.212)
	[15.809]	[2.481]	[2.605]	[2.779]
PCi	1.061*	0.275***	1.193*	0.203
	(0.526)	(0.183)	(0.352)	(0.155)
	[2.890]	[1.317]	[3.297]	[1.225]
Psuedo R2	0.57	0.25	0.40	0.25
Chi2(3)	68.10*	78.71*	62.28*	53.70*
Count R2	0.95	0.78	0.84	0.73

Notes:

(1) The dependent variable is a dummy variable that takes the value of one if centre i has any form of presence in centre j and zero other wise.
(2) The dependent variable is a dummy variable that takes the value of one if centre i operates a subsidiary in centre j and zero other wise.
(3) The dependent variable is a dummy variable that takes the value of one if centre i operates a branch in centre j and zero other wise.
(4) The dependent variable is a dummy variable that takes the value of one if centre i operates a representative in centre j and zero other wise.
(5) See the above table for the description of explanatory variables. Differences in corporate tax rate was insignificant in all specifications and hence was dropped from the equation.

The model in the number of representative offices does not perform very well. It seems that none of our explanatory variables (except for the size of the country of origin) can

explain the number of representative offices in a location. This could be due to the fact that representative offices engage mainly in merchant banking services which are related to brokerage services such as arranging loans between home borrowers and host lenders (Heinkel and Levi, 1992). None of our explanatory variables capture this activity and hence the low performance of this model should not be surprising.

In short, the results show quite clearly that the impact of explanatory variables is different across subsidiaries, branches, and representative offices. Only the equation in branches yield similar results to those obtained from the total number of bank offices. Our agglomeration-diversity index enters with the expected positive sign in all equations except for the equation in the number of representative offices which is not significant. This may suggest that in order for international banks to participate in a centre's financial markets, they must establish branches or subsidiaries there rather than rely on representative offices.

6.5 Conclusion

In this chapter, we test a number of hypotheses that emerge from the previous theoretical discussion, employing data from the largest financial centres of the world. Specifically, we provide empirical evidence on the importance of dynamic benefits in explaining the location of multinational banks. Furthermore, we test for the hypothesis that banks establish in a centre in order to benefit from the agglomeration economies and to have access to diversified financial markets. In order to test this hypothesis, we first construct an index of diversity of financial markets based on the variety of financial products and the level of complexity and size of the centre's financial markets. Only countries with highly diversified financial markets are included.

Furthermore, we use this index as an explanatory variable to examine the impact of the diversity of financial markets on banks' location. Another important aspect of financial centres is their ability to generate agglomeration economies. However, given the close association between bank agglomeration and deeper financial markets (Choi et al, 1986), these two can not be included together in the same equation because of the problem of high multicollinearity. In order to avoid this problem, we use a summary measure of these two variables using the statistical method of principal components (Theil, 1971). The empirical results suggest that after controlling for variations in regulatory and tax structure, the size of the country of origin and bilateral trade, banks' desire to capture agglomeration benefits and participate in larger and more diversified financial markets influence their decision to establish offices abroad. This conclusion applies mainly to the number of branches across countries.

Capital Controls on	Capital Market Securities		Money Market Instruments		Collective Investment Securities		Derivatives and other instruments		Financial Credit		Direct Investment		Provisions to commercial bank and other credit institutions					
	Purchase in the country by non-residents	*Sale or issue locally by non residents*	*Purchase in the country by non-residents*	*Sale or issue locally by non residents*	*Purchase in the country by non-residents*	*Sale or issue locally by non residents*	*Purchase in the country by non-residents*	*Sale or issue locally by non residents*	*By residents to non residents*	*To residents from non residents*	*Inward Direct Investment*	*Liquidation of Direct Investment*	*Purchase of locally issued securities*	*Reserve requirements*	*Lending locally in foreign exchange*	*Lending to non residents*	*Interest rate controls*	*Total Points*
Australia	2	2	0	2	0	0	2	2	0	0	1	0	0	1	0	2	1	15
Belgium	0	1	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	5
Canada	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	2	2	2	2	0	2	0	0	0	0	1	1	0	0	0	0	0	12
Germany	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	3
Hong Kong	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Japan	1	1	0	1	0	0	0	0	1	0	1	0	1	0	2	0	1	9
Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0
Spain	1	0	0	0	0	0	0	0	1	1	1	0	0	1	2	0	0	7
Switzerland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	4

2 = Restricted
1= Allowed but subject to certain conditions such as the approval from the monetary authority of that country
In case of direct investment, inward direct investment is restricted to certain sectors
0= no restrictions

Source:IMF (1996), Annual Report on Exchange Restrictions

Chapter 7 - The Emergence and Evolution of Banking Centres

7.1 Introduction

Recent movements towards the liberalisation of trade in financial services and implementation of financial sector reforms in many parts of the world have increased the importance of cross border banking activity. This is reflected clearly in table 7.1 below which shows that the ratio of cross border assets to domestic credit has become important in many countries.

Table 7.1 – The Ratio of Cross Border Assets to Domestic Credit
(end of 1997)

Country	Ratio of External Assets to Domestic Credit
Norway	0.11
United States	0.12
Italy	0.18
Canada	0.18
Spain	0.19
Japan	0.21
Germany	0.22
Austria	0.26
Sweden	0.27
Finland	0.28
France	0.45
Netherlands	0.45
Denmark	0.62
Belgium	0.71
United Kingdom	1.02
Switzerland	1.12
Ireland*	2.06
Hong Kong	2.091
Singapore	6.88
Bahrain	60.43
The Bahamas	77.3

* End of 1996

Source: Data on external assets were obtained from the BIS, *International Banking and Financial Markets Developments*; Data on the stock of domestic Credit were obtained from IMF, *International Financial Statistics* and were converted into US dollars using the average exchange rate also obtained from IMF, International Financial Statistics.

Although all countries engage in some form of international banking activity, only a small number of countries have specialised in international banking. The above table

shows that it is possible to classify countries into four groups according to the importance of cross border banking activity as a proportion of total banking activity (Arndt, 1988). The first category consists of developed countries with relatively low ratios of cross border assets to domestic credit. The second category consists also of developed countries with more substantial, but more moderate ratios (Belgium and Denmark). The most interesting category is the third one which consist of countries with very high ratios of cross border assets to domestic credit (Hong Kong, Singapore, United Kingdom, Switzerland and Ireland). The final group consists of some offshore centres with extremely high ratios (The Bahamas and Bahrain). While countries in the first and second group engage in cross border lending to an extent related to the size of their economies or the volume of their international trade, countries in the third group have managed to specialise in cross border lending activity.

Despite the growing importance of cross-border banking and the vital role that some centres play in that process, the literature has provided very few theoretical models to explain the emergence of these centres. In principle, one would expect the literature on financial centres to provide some insights into this matter. However, the main focus of this literature has been on the study of the major forces responsible for the agglomeration or dispersion of financial activity using the elements of industrial location theory (Davis, 1990).

Despite the dominance of this trend in the literature, there have been few theoretical attempts to explain the emergence of these centres. Most of the theoretical studies have dealt with the issue of emergence within the context of MNC and/or trade

theory. In particular, the ability of some centres to specialise in the delivery of financial services has mainly been explained in terms of the locational advantages of a centre. These locational advantages can arise from many sources such as easy access to multinational corporations or face to face contact with customers and other banks (Dunning, 1993; Gray and Gray, 1981). Other studies have focused on features such as historical character, favourable regulatory environment, advanced communication system, human capital, political and economic stability, time zone, geographical location and strong currency to explain the emergence of a certain country as a financial centre. For instance, Grubel (1986) argues that the regional banking business of Hong Kong "was fostered by comparative advantage which the local communities developed during their colonial status, when English banking skills were the best in the world and dominated international capital markets. Their comparative advantage results from the central locations of these countries and deliberate support which government policy provided for its advance. Human capital, good communications systems and a favourable regulatory environment are essential ingredients in the development of this business" (p.253-54).

In this respect, it is important to note that differences in regulatory and tax structure remains the typical explanation for the emergence of banking centres (Eaton,1994; Cassard, 1994). Countries with lower tax rates and flexible regulatory environments, reflected for instance in lower reserve requirements, tend to have lower spreads and hence would specialise in the provision of both deposits and loans. For instance, in Eaton's (1994) overlapping generation model, countries in which monetary authorities place less weight on seigniorage revenue (i.e. systems which rely less on the taxation of the financial system) can offer higher rates of return on deposits and charge lower

rates of interest on loans. As a result, such countries are able to attract deposits from abroad and finance non-resident borrowers. This cross border role reflects a country's competitiveness as an intermediary where the source of competitiveness in this case is the regulatory environment.

Arndt (1988) suggests a different explanation for trade in financial services, arguing that the crude application of elements of trade theory to financial services is inadequate. For instance, although countries with abundant capital have a comparative advantage in trade in financial services, the source of comparative advantage is not a cost advantage due to abundance of capital. Instead, Arndt (1988) stresses the importance of economies of scale as the major determinant of comparative advantage in trade of financial services. Only countries that achieve economies in scale in the provision of financial services are in a position to export financial services. According to Arndt, the source of these economies of scale is a large domestic market "i.e. demand by residents for banking and other financial services" (p.72).

This chapter's main contribution lies in building a model of emergence of banking centres which is based on a combination of efficiency and economies of scale in intermediation. In particular, we show that the rate of return on savings offered by a financial centre is a function of a measure of efficiency of financial intermediation and a measure of scale of financial activity which reflects economies of scale. But unlike Arndt (1988) who considers only domestic demand, we consider the possibility of demand arising from regional economies which can form an important source for economies of scale for banking centres. An explanation of emergence based on efficiency of financial intermediation and a broader concept of economies of scale

allows us to capture two important features of emergence of banking centres. The first feature relates to the possibility of multiple equilibria. In the case when the country has sufficient savings and is faced with a certain critical mass of investment opportunities at home and abroad, that country could in principle emerge as a financial centre since it can offer a rate of return higher than the opportunity cost for savers in countries with surplus funds. This case corresponds to the emergence of international financial centres such as London (in the 19th century), New York and Tokyo which established themselves as important centres as a consequence of the size of their economies. However, in principle and in history there are few examples of countries such as Singapore and Hong Kong, which do not have a sufficient amount of domestic savings and are not faced with a sufficient mass of domestic investment opportunities, but still managed to emerge as important banking centres. In such cases, the model shows that the emergence of a country as a financial centre depends on two demand side conditions. First, the country must face a sufficiently large demand for funds which is usually generated from its regional economies. Second, the centre must be able to attract a certain critical mass of savings from a sufficient number of countries, usually from outside the region. When these two conditions are satisfied, then emergence could occur. However, if "surplus" countries channel their savings through various countries and/or regional economies satisfy their demand for funds from various places, then emergence may not occur.

It is important to note that in this model, efficiency does not determine emergence in the sense that it is not necessarily true that the country with the most efficient intermediation will emerge as a banking centre. A country with less efficient financial intermediation could also emerge as a financial centre, but the amount of savings

which needs to be intermediated through the centre must be larger for such emergence to occur. This allows for some element of indeterminacy in the model, and hence other elements such as historical chance or "first mover" advantage can play an important role in determining which country emerges as a banking centre. This aspect of emergence has not been adressed before.

Our model captures another important feature of financial centres which relates to the possibility of a reinforcing mechanism or "path dependence" process which suggests that once a centre has been established, it would continue to thrive. In other words, once a country emerges as a banking centre, "surplus" countries would have the incentive to place funds in it, reinforcing the centre's supremacy. However, as suggested in Chapter 5, a shift to a new negative growth path could occur due to a strong shock which reverses the flow of savings or due to a series of small shocks that decrease the attractiveness of the centre over time.

A careful examination of the balance sheet of various financial systems shows that banking systems can be divided into four categories according to their net position against the rest of the world (Eaton, 1994). On the liabilities side, the bank can be net borrower or net depositor abroad. On the asset side, the banking system can be net borrower or net lender. Based on these categories, we can classify banking systems into banking centres, inwards transformer, outward transformers or dis-intermediators (Eaton, 1994). Banking centres play an important role in transfer of funds across regions. They attract funds from non-resident depositors (mainly through the interbank market) and extend loans to non-resident borrowers. These centres are likely to emerge in regions with high investment opportunities. A dis-intermediated

banking system on the other hand channels deposits abroad and receives loans from abroad and hence part of its financial intermediation is being performed abroad. Between these two extremes, an outward transformer channels deposits and extends loans abroad while the inward transformer attracts both foreign deposits and loans (Eaton, 1994). The outward transformer is likely to develop in regions where there are excess savings and no investment opportunities due to low absorptive capacity while inward transformers are likely to emerge in economies with large investment opportunities.

This chapter makes the additional contribution of explaining the above categories by taking the analysis one step further. Specifically, we examine the evolution of cross border flows where by evolution we mean, that starting from a position where a financial intermediary finances both domestic and foreign production, the intermediary can evolve and specialise in foreign or domestic funding. In our model, crucial for the evolution of foreign and domestic financial intermediation is transferability of knowledge related to real production which implies the possibility of applying local investment opportunities abroad and vice-versa. Based on transferability of knowledge, it is possible to identify three possible processes of cross border flows. In case of complete transferability of knowledge by which the domestic country and foreign country grow at the same rate, both types of lending activity tend to co-exist. In other words, the intermediary would finance both domestic and foreign production. This situation can go on indefinitely as long as the economy is not saving constrained. On the other hand, when transferability of knowledge is incomplete, a financial intermediary specialises in funding one country. As a result, two extreme cases can emerge such that the financial intermediary either supports domestic

production (an extreme case of an inward transformer where the intermediary transforms all foreign inflows into domestic loans) or foreign production (an extreme case of an outward transformer where the intermediary transforms all inflows and large part of its domestic savings into foreign loans).

This chapter is important for two main reasons. First, it tries to explore theoretically the links between a banking centre's development and evolution and the economic performance of regional economies. Some economists have suggested that these links exist, but they do not provide any theoretical or empirical evidence on this matter (Byrant, 1987).[1] Second, this chapter analyses the role of these centres in terms of balancing savings and investment across geographical countries or regions, an important aspect of financial centres which was not discussed explicitly before. Previously, the main focus was on identifying the major processes responsible for agglomeration and dispersion of financial activity, but no attempt was made to analyse the role of these centres. This chapter sets the necessary conditions under which a certain country can perform the regional or international role of balancing savings and investment across countries. It also proposes an alternative way at looking at emergence which is not based on static comparative advantage or the concept of locational advantage of MNC theory, but on a broad concept of economies of scale. This allows us to explore some interesting features related to financial centres some of which have been emphasised in previous chapters such as agglomeration effects in financial activity.[2]

[1] Empirical evidence on these links is the subject of the next chapter.

[2] It is important to note that modelling techniques used in this chapter are quite different from previous ones. This has to do with the different nature of issues we are dealing with. While in previous chapters the focus has been on agglomeration and dispersion forces, the focus of this chapter is on emergence and evolution of financial centres. Since our story of emergence is based on economies of scale and comparative advantage, it is very useful to resort to the insights of trade theory.

This chapter is divided into three parts. Section 2 discusses the emergence of financial centres while section 3 analyses its evolution. The last section contains my conclusion.

7.2 The Benchmark Model

The aggregate economy consists of a continuum mass of h regions, each has a population constituted by a continuum of mass l of three period living agents and a continuum of firms distributed on a segment of size H. Each agent has an endowment of labour equal to 1. Therefore, aggregate labour equals l. The agent supplies labour at period one, gets paid a wage w at period two which is deposited at the bank and consumes his income and the return on the deposits in the third period. Each firm has access to M_t varieties of investments.[3] Each investment requires one unit of physical capital and each project has a certain return $R>1$ after one period. These firms do not have any endowment and therefore fund these investment projects via borrowing. Firms operate under perfect competition which implies that each firm makes zero profits. Due to the existence of capital market imperfections, which implies a non-convex financial transaction technology, borrowing is guaranteed by a single intermediary (a bank) which operates as a monopolist pooling savings in the form of deposits and issuing loans to firms (Diamond, 1984).[4] Note that we assume free entry in the financial sector so that the bank operates at zero profits.[5] We assume that the

[3] M_t measures technical knowledge. Note that to each element of M_t, there corresponds a variety of investment opportunity. This is consistent with the standard interpretation provided in the horizontal product variety expansion models of endogenous growth (Romer, 1990).

[4] In Diamond's model (1984) for instance, the monitoring activity of the bank reveals information which is a public good. Efficiency requires that only one lender (a bank) will perform the monitoring activity on behalf of all other lenders (the depositors). The ability of banks to hold very large portfolios eliminates the risk of bankruptcy and hence solves the problem of "monitoring the monitor".

[5] To keep things as simple as possible, we model the credit market as monopolistic one with free entry. Monopoly is sustainable in the long run equilibrium if potential entrants do not have enough market to make sufficient profits to compete with the monopoly bank in the market for labour. Specifically, the monopoly bank hires workers at time t and commit itself to pay a salary w_t. If another bank wishes to

bank can select only one location. In this case, it is optimal for the bank to locate at the midpoint of the segment where it can serve both sides of the market.

7.2.1 The Lending Technology

The lending technology implies that in order to channel funds to firms a positive amount of physical resources equal to $c = c\ (z_l, l) < 1$ per firm i, with $i \in [0, M_t]$ plus a fixed amount C are consumed when funds are channelled towards production.[6] The fixed cost C reflects the existence of economies of scale in intermediation. Note that z_l is the distance between the location of the bank relative to the firm. We assume $c\ (z_l, l)$ is increasing in z_l because information quality decays with distance (Sussman, 1993),[7] and decreasing in the amount of labour (l) used by the bank.

7.2.2 Agent's Behaviour

At each time t, young agents who are paid a salary w_t, save via deposits. Deposits are paid a rate of return r. As an alternative to deposits, w_t can be saved in a safe storage technology with a gross return equal to ρ. It naturally emerges that in order to have financial intermediation, $r > \rho$ must hold.

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enter the market, it has to commit itself to repay a salary w_t. If as a result of the structure of the economy, the entrant bank can not make enough profits to pay w_t, then workers who are perfectly rational will judge the promise of the potential entrant as not credible, thereby staying employed where they are.

[6] Note that *c(..)* here refers to the costs involved in lending or intermediation technology in general. It is possible to be more specific about the nature of these costs. For instance, these costs could correspond to monitoring costs as in Diamond's model or simply costs involved in information gathering about different project. For simplicity, we refer to *c(..)* as the lending technology.

[7] z_l can be interpreted in terms of spatial factors or in terms of variety of investment opportunities. In the latter case, the assumption about the cost structure reflects economics of specialisation. For

7.2.3 *The Closed Regional Economy*

We first describe the macroeconomic equilibrium of each region i as a closed economy. Specifically, we establish a relationship between the rate of return on savings and the efficiency of financial intermediation and the level of technical knowledge.

Revenues associated with M_t investments are M_tR. In order to run M_t investments, the intermediary requires $[1+ c(.,.)]\ M_t + C$ units of funds, and l units of labour. Total cost is then equal to payments to savers which equal to $r[1+ c(.,.)]\ M_t + rC$ plus payments to labour, lw_{t+1}. Then assuming $c\ (z_t,l) = az_tl^{-\alpha}$ where a is a direct measure of financial efficiency, the profits over a mass z_t can be written as follows[8]:

$$\pi_t = 2\int_0^z [R - r(1 + a\, z_t l^{-\alpha})] M_t\, dz - rC - l\, w_{t+1} \qquad (1)$$

The intermediary chooses z_t and l in order to maximise profits. The first order conditions associated with this maximisation problem are:

$$[R\text{-}r]\ \ M_t = M_t\,(az_tl^{-\alpha})\ r\ ; \qquad (z_t > 0) \qquad (1.a)$$

$$w_{t+1} = r\,a\,l^{-\alpha-1}\ \alpha z_t^2 M_t \qquad ; \qquad (l > 0) \qquad (1.b)$$

The last condition implies that the level of wages paid to labour depend positively on the amount of investment funded by the intermediary, z_tM_t.[9]

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instance, the bank may have better information about certain entrepreneurs due to past relationship and hence it is the less costly for that bank to fund that particular firm.

[8] Note that for the ease of exposition, we drop region index i.

Then using the free entry condition together with the above expression we have[10]:

$$z_t = \frac{[Cal^{-\alpha} / M_t(1-\alpha)]^{1/2} + \alpha}{(1-\alpha)\, l^{-\alpha-1}} = z_t^* \qquad (2.a)$$

where z^* is the optimal mass of firms funded by the intermediary[11] and l is the amount of labour in the economy.

We also derive the rate of return on savings guaranteed by the intermediary,

$$r = \frac{R(1-\alpha)}{1 + [Cal^{-\alpha} / M_t(1-\alpha)]^{1/2}} \qquad (3)$$

Notice that both z_t and r depend positively on the efficiency of the financial technology (summarised by parameter a)[12], labour employed by the bank (l), and the level of technical knowledge, M_t.

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[9] In other words, the marginal productivity of labour is a linear function of the level of technical knowledge.

[10] Substituting for $w_{t+1} l = r\, az_t^2 l^{-\alpha}\, \alpha M_t$ (using 1.a) and $[R-r]\, M_t z_t = M_t\, (az_t^2 l^{\alpha})\, r$ (using 1.b) into the profit function and imposing $\pi_t = 0$, we find:

$$[R-r]\, M_t z_t (1-\alpha) - Cr = 0$$

Then using the fact that $z_t = (R-r) / ar\, l^{-\alpha-1}$ which follows from the FOC associated with the choice of z_t (1.b) and substituting again in the above equation we obtain:

$$r = \frac{R(1-\alpha)}{1 + [Cal^{-\alpha} / M_t(1-\alpha)]^{1/2}}$$

Then, substituting r back into the expression of z_t, we obtain:

$$z_t = \frac{[Cal^{-\alpha} / M_t(1-\alpha)]^{1/2} + \alpha}{(1-\alpha)\, l^{-\alpha-1}}$$

[11] Note that in equilibrium, the optimal level of z_t selected by the bank provides a measure of the mass of firms which are funded in the economy. Specifically, $2\int_0^z 1\,dt = 2z_t$ is the total mass of firms funded.

7.2.4 *Macroeconomic Equilibrium*

Financial centres play an important role in balancing saving and investment across geographical regions (Kindleberger, 1974). In order to explore fully this aspect of financial centres, we need to examine macroeconomic equilibrium in different regions. Investment activity in each region implies $I^i_t = 2\, z^i M_t$[13]. Gross savings (S_t) are given by the total income of young agents, $w_t l = z^{2i}_{t-1}\, ra l^{-\alpha}\, \alpha M_{t-1}$. A fraction $c(.,.)$ of gross savings, plus C is consumed in the process of channelling funds towards investment. Therefore, net savings channelled toward investment can be expressed by:

$$S^i_t = w_t l - a z^i_t l^{-\alpha} M_t - C$$

Or

$$S^i_t = a l^{-\alpha} (z^{2i}_{t-1}\, r\, \alpha M_{t-1} - z_t M_t) - C \qquad (4)$$

Where S_t denotes net savings. Comparing I_t with S_t, it emerges that in order for investment and savings to be equal, the following equality has to hold:

$$1 = \frac{a l^{-\alpha} (z^{2i}_{t-1}\, r\, \alpha M_{t-1} - z_t M_t) - C}{2 z^i M^i_t} \qquad (5)$$

This inequality however need not hold at each point in time. For each single region i, investment opportunities imply a demand for funds which can be higher, equal to or lower than the amount of savings. In particular, whenever $1 < [a l^{-\alpha} (z^{2i}_{t-1}\, r\, \alpha M_{t-1} - z_t M_t) - C] / 2 z^i M^i_t$ holds, savings are more than what is necessary to fund all investment opportunities in the region's economy. This means that the intermediary is not

[12] Notice that a could reflect effeiency due to the tax and regulatory structures. That is to say that countries with less regulation and lower taxes could offer a higher rate of return on savings.

[13] Since each entrepreneur has access to M_t investments with each one requiring one unit of capital, then $2 z_i M_t$ is the total amount of resources required to fund the total mass of investments in the economy.

constrained in its decision about z_t, i.e. $z_t = z^i$ where z^i is the optimal level of z_t chosen by the intermediary.

Whenever the reverse inequality holds, i.e., whenever $1 > [al^{-\alpha} (z^{2i}_{t-1} r \alpha M_{t-1} - z_t M_t) - C]/ 2z^i M^i_t$ regional savings are not enough to fund all investment opportunities. In this case, the regional economy is financially constrained.

7.2.5 Financial Centre Lending Activity

We consider here a case in which one region could act as a banking centre, pooling funds from the region in which savings are greater than investment opportunities and potentially channelling funds to the region in which savings are lower than investment opportunities. Let us interpret regions as distinct countries. We assume that the one country's intermediary faces no constraints in the amount of savings so that it can optimally select the amount of investment activity both in the foreign and domestic economy. Furthermore, we assume that as the financial intermediary starts operating in the foreign country, it exports the amount of technical knowledge, M_t, already available in the domestic economy.[14] We also differentiate between domestic lending activity which requires l^i of labour and foreign lending activity which requires l^j of labour and such that $l = l^i + l^j$.

Assuming that lending technology in the foreign region implies a variable cost $c(z_t, l) = bz_t l^{-\alpha}$, the profit function for the country's intermediary can be written as follows:

$$\pi t = 2\int_0^{z^i} [R^i - r] M_t^i dz + \int_0^{z^j} [R^j - r] M_t^j dz - 2\int_0^{z^i} (r M_t^i a_{zt}^i l^{i-\alpha}) dz - 2\int_0^{z^j} (r M_t^j a_{zt}^j l^{j-\alpha}) dz - rC - w_{t+1} l^i - w_{t+1} l^j$$

The profit function is the same one as before, but it takes into account the lending activity in the foreign region. The banking centre chooses the optimal quantities of labour to be used in the domestic (foreign) financial activity l^i (l^j) and the amount of investments to be funded in the domestic (foreign) economy z^i (z^j) in order to maximise the above. The set of first order conditions is:

$$[R^i - r] M_t^i = M_t^i (raz_t^i l^{i-\alpha})$$

$$[R^j - r] M_t^j = M_t^j (rbz_t^j l^{j-\alpha})$$

$$w_{t+1} = r \alpha a M_t^i z_t^{i2} l^{i-\alpha-1}$$

$$w_{t+1} = r \alpha b M_t^j z_t^{j2} l^{j-\alpha-1}$$

After some manipulations, we can write:

$$z_t^i = \frac{[R - r] l^{i\alpha}}{ra}$$

$$z_t^j = \frac{[R - r] l^{j\alpha}}{rb}$$

$$M_t^i z_t^{i2} l^{i-\alpha-1} = M_t^j z_t^{j2} l^{j-\alpha-1}$$

Then,

[14] It follows from this assumption that the level of technical knowledge is the same in both economies. This assumption is made for simplification. We could obtain the same results even if only a fraction of

$$\frac{z_t^i}{z_t^j} = \frac{b}{a} \left(l^j/l^i\right)^{-\alpha}$$

$$\frac{M_t^i z_t^{i\,2}}{M_t^j z_t^{j\,2}} = \left(l^j/l^i\right)^{-\alpha-1} = x_t \left(z_t^i/z_t^j\right)^2$$

Where $x_t = M_t^i / M_t^j$. Substituting the latter equation into the former, we get:

$$\left(l^j/l^i\right)^{\alpha-1} = x_t (b/a)^2$$

$$\Rightarrow$$

$$l^j/l^i = \left[1/x_t (a/b)^2\right]^{1/1-\alpha}$$

and using the fact that $l = l^j + l^i$, we find :

$$l^j = \frac{l \left[1/x_t (a/b)^2\right]^{1/1-\alpha}}{1 + \left[1/x_t (a/b)^2\right]^{1/1-\alpha}} \qquad (5)$$

which shows that l^j is decreasing in x_t.

To calculate the equilibrium expression for both z^i ,z^j and r we use the no profit condition to obtain:

$$r = \frac{R \left[z_t^{i*} x_t + z_t^{j*}\right] (1-\alpha)}{C/M_t^i + (z^{i*} x_t + z^{j*}) (1-\alpha)}$$

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the technology is transferred.

$$z_t^i = C\, l^{i*\alpha} / \alpha a$$

$$z_t^j = C\, l^{j*\alpha} / \alpha b$$

7.2.6 *Endogenous Emergence of Financial Centres*

Consider the expression for r obtained in the previous section:

$$r = \frac{R\,[z_t^{i*} x_t + z_t^{j*}]\,(1-\alpha)}{C/M_t^i + (z_t^{i*} x_t + z_t^{j*})\,(1-\alpha)}$$

Substituting the equilibrium values for z_t^{i*} and z_t^{j*}, r can be expressed as follows:

$$r = \frac{R\,[(Cl^{i*\alpha} / \alpha a) + (Cl^{j*\alpha} / \alpha b)]\,(1-\alpha)}{C/M_t^i + [(Cl^{i*\alpha} / \alpha a) + (C\,l^{j*\alpha} / \alpha b)]\,(1-\alpha)} \qquad (6)$$

For a given distribution of labour, it follows that r depends only on M_t^i given the values of R, a, and b. In particular, it can be easily verified that the higher is M_t^i, the higher is r. This relationship provides the basic insight for our story of emergence as we demonstrate below.

For simplicity, we assume that $a = b = k$. Then, from the equilibrium equation for l^i and l^j, it follows that $l^i = l^j = l/2$.[15] The expression of r can be therefore written as:

$$r^i = \frac{R\,[(C/\alpha) + (C/\alpha)]\, l^{\alpha}/2k\,(1-\alpha)}{C/M_t^i + [(C/\alpha) + (C/\alpha)]\, l^{\alpha}/2k\,(1-\alpha)}$$

[15] Since $l^i + l^j = l$ and given that $l^i = l^j$, then $l^i = l^j = l/2$.

It is clear from this expression that r^i is an inverse function of k and C/M_t^i. The coefficient k can be thought of as a parameter which measures efficiency of financial intermediation across the h economies: the lower is k, the higher is efficiency. The ratio C/M_t^i reflects the existence of economies of scale in financial activity. Given that each firm requires one unit of capital, and given the equilibrium values of z_t^{i*} and z_t^{j*}, the overall mass of investments funded by the centre which also reflects the overall level of financial activity of a potential financial centre is given by: $M_t (z_t^{i*} + z_t^{j*})$. As such, M_t can be thought as a measure of the scale of financial activity.

Assume that countries can be ranked according to k. Thus, to each country there corresponds a different level of efficiency i.e. a different value of k. Given that r is a positive function of M_t, therefore, we can specify a value of M, call it M^*, such that the country with the most efficient financial intermediary (i.e. with the lowest k) could become a financial centre because it can offer foreign depositors a rate of return $r \geq \rho$, i.e. a rate of return at least equal to ρ which is the return on storage technology available to savers who can not save via domestic deposits in each of the other h economies. We label the most efficient country as country i. Note that countries with less efficient financial intermediary could also emerge as financial centres if they are able to attract a critical mass of foreign savings, although in order for emergence to occur the critical mass of savings needed is higher than that associated with country i.

In this model, despite its efficiency, country i does not automatically emerge as a financial centre. It emerges only under the following condition. The critical value M^* indicates that country i emerges as a financial centre if it can fund an amount of domestic investment activity at least equal to $z_t^i M^*$ plus an amount of investment

activity in the foreign country equal to $z_t^j M^*$. In order to meet this scale, two conditions are required:

(i) Sufficiently large demand for loans i.e. the mass of investments to be funded, $2M_t (z_t^{i*} + z_t^{j*})$ has to be sufficiently high, i.e. $M_t (z_t^{i*} + z_t^{j*}) > (z_t^i M^* + z_t^j M^*)$;

(ii) Sufficiently high demand for deposits, i.e. the mass of savings that the potential financial centre is able to pool has to be at least equal to $2(z_t^i M^* + z_t^j M^*)$.

The two above conditions are two demand-side conditions which have to be satisfied in order for a specific country's financial system to emerge as a financial centre.

Assuming condition (i) is satisfied,[16] then two different scenarios emerge:

Either

(i) Country i has enough domestic savings to fund $2(z_t^i M^* + z_t^j M^*)$ investment projects.

Or

(ii) Country i does not have enough domestic savings to fund $2(z_t^i M^* + z_t^j M^*)$ investment projects.

In case (i), country *i* could emerge as a centre since it can attract deposits from other countries and channel part of its savings to fund investment in foreign countries while offering a rate of return *r* higher than the opportunity cost for savers in countries with surplus of funds. In this case, there is no indeterminacy. We can perhaps think of this

situation as corresponding to examples of international financial centres such as New York, Tokyo, and London (at the beginning of this century) which emerged as centres for the rest of the world as a consequence of the size of their economies. In fact, this may explain "why the four largest international financial centres (London, New York, Tokyo and Paris) are also financial centres of four out of the five largest economies" (Grilli, 1989).

More specifically, given the level of technical knowledge M_t^i, country i has a level of aggregate net savings equal to:

$$S_t^i = aI^{\alpha}\,(z^{2i}{}_{t-1}\, r\, \alpha M_{t-1} - z_t M_t) - C$$

The mass of funds required to fund the aggregate domestic and foreign level of investment activity is:

$$I^{i+j} = 2(z^i + z^j)\, M_t^i$$

As long as $I^{i+j} > S_t^i$, country i is in a position to attract foreign funds from the other h countries. The portion $\delta \leq 1$ of the total mass of countries which channel funds to the centre is:

$$\int_0^h S_{t\rho}^j\, dj = I^{i+j}$$

[16] In case of small open economies such as Hong Kong, the large demand for funds is likely to come from its regional economies, which suggests that there exist few links between the banking centre and the economies of the region. These links are explored empirically in the next chapter.

Where for each country $j \in [0,h]$, $S^j_{t\rho} = S^j_t - I^j_t$. According to our simplifying assumption, the above equation indicates that these countries channel an amount of savings through the banking centre equal to the amount of savings which are not invested in local production activity.

7.2.7 *Indeterminacy*

Differently from the situation just described, in case (ii) where country i does not have enough funds to finance the critical amount M^* of investment opportunities, the emergence of country i as a financial centre is not straightforward. In fact, country i can not offer a rate of return to savers higher than the opportunity cost ρ. However, country i is still in a position to pay $r \geq \rho$ if it can attract sufficient funds from a number of foreign countries. This requires some sort of co-ordination. Unless a large number of countries agree to channel their savings through a certain country, the possibility of emergence becomes remote. However, there is no mechanism to trigger such collective action. Therefore, there is a clear indeterminacy case due to what we can describe as a co-ordination failure problem. This generates the possibility of multiple equilibria.

One important implication from this analysis is that it is not true that the country with the most efficient financial intermediary (i.e. country i) will emerge as a banking centre. To put it differently, efficiency in this model does not determine emergence. This is in contrast with the existing literature which explains emergence in terms of static comparative (or absolute) advantage only. A country with less efficient financial intermediary could also emerge as a regional centre if it is able to attract the critical mass of foreign savings, although in order for emergence to occur the amount

of savings needed is higher than that required by country i. It follows from this analysis that explaining the geographical location of centres is not straightforward. For instance, factors such as chance or first mover advantage rather than efficiency may have contributed greatly to the emergence of centres. In fact, many economists tend to argue that the distribution of economic activity is probably close to indeterminate, so the location of economic hot spots is largely a matter of historical accident.

7.2.8 *Agglomeration Effect*

Suppose that as M_t^i grows, I^{i+j} grows faster than S_t^{δ}. Then country i has to attract funds from a higher mass of foreign countries. But being a financial centre already, country i, by definition, has the ability to offer a level of r such that all foreign countries have an incentive to fund it. Therefore, new countries will join the mass δh up to a portion $\delta' > \delta$ such that $S^{\delta'}{}_t = I^{i+j}$. This suggests that a reinforcing mechanism, similar to the one described in chapter 5, is at work here. In particular, once a region has established itself as a centre, it will continue to attract newcomers unless a strong shock occurs that reverses the flow of savings.

7.3 Dynamics of Cross Border Lending Activity

We move the analysis one step further and examine the evolution of cross border lending. By evolution we mean that starting from a position where a financial intermediary funds both domestic and foreign production, the intermediary can evolve and specialise only in funding one region. This analysis would help us establish what are the main factors that determine the nature of the banking system.

We assume that $M_{t+1}{}^{i} = g(M_t^i)$ and $M_{t+1}{}^{j} = f(M_t^j)$, with $g`(.), f`(.) > 0$, Where M_t^i is the level of technical knowledge developed in country i at time t.[17] Then, whenever M_t^i and M_t^j grow at different rates, i.e. $g`(.) \neq f`(.)$, the country which initially performs external lending activity is subject to a polarisation process by which it either performs foreign financial activity only without supporting domestic production (the extreme case of an outward transformer) or supports local financing activity (the extreme case of an inward transformer). Crucial to this polarisation process is international transferability of knowledge.[18] If knowledge M_t is perfectly transferable from one country to another, then whatever the functions $g(.)$ and $f(.)$ are, technological spillovers would lead to a situation in which the level of M in both regions, at period $t+1$, will be equal to the maximum between $f(M_t^j)$ and $g(M_t^i)$, i.e. $M_t^j = M_t^i = \max(f(M_t^j), g(M_t^i))$ where $f(M_t^j)$ and $g(M_t^i)$ represent the levels of local knowledge developed as a consequence of local production technology. In this case, x_t stays constant over time so that the financial intermediary would support both domestic and foreign production. This situation carries on indefinitely provided that the international intermediary is not saving constrained. Conversely, when knowledge is not completely transferable, at each time $(t+1)$, the level of knowledge available in both regions will depend on the level of M_t of the region even after accounting for spillover effects. Therefore, the ratio $x_t = M_t^i / M_t^j$ will stay constant if and only if $g(.) = f(.)$. When $f(.) > g(.)$, x_t goes to infinity and as a consequence i^j goes to zero (Equation 5), such that the financial intermediary becomes an inward transformer. In

[17] We assume that in general $M_{t+1} = f(M_t, 2z)$ where $2z$ is the equilibrium mass of firms funded by the bank. Then as a particular case, we can analyse the linear case in which $M_{t+1} = z M_t$. Then the growth rate is simply $z-1$. Note that this holds at the local level. When there is more than one country, the evolution of knowledge depends on spillovers.

[18] We assume that as the bank starts operating in the other region, all the technical knowledge is transferred there. However, this is not crucial a assumption and we could obtain the same results even if a fraction of technology is transferred. What is important is that the subsequent evolution of the local

the opposite case, l^i goes to zero such that the intermediary becomes an outward transformer.[19]

This discussion can be formalised in the following proposition.

> **Proposition** *if technology is perfectly transferable, the financial intermediary does not specialise completely, i.e. foreign and domestic financial activities co-exist. When technology is not perfectly transferable, spillover effects do not prevent the polarisation of financial activity.*

In this section, we have analysed the evolution of financial centres and given a formal theoretical underpinning to previous chapters' discussion of the nature of various banking systems. The theoretical discussion suggests that outward transformers are likely to emerge in international regions characterised by low investment opportunities and low growth rates. The best historical examples of such type of banking system are Beirut in the 50s and 60s and Bahrain in the 80s and 90s which emerged in a region characterised by low growth rates and limited investment opportunities. These centres channelled surplus savings from the Middle East region to Euromarkets which offered a higher rate of return on savings. On the other hand, regional banking centres and inward transformers are likely to emerge in regions characterised by high growth rates and large investment opportunities. Hong Kong

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economy can be independent (at least partially) from the evolution of the stock of knowledge in the domestic economy. This depends on whether technological spillovers are perfect or not.

[19] Notice that these channels work through wage discrepancy between foreign and domestic lending activity. If domestic knowledge grows more rapidly than foreign knowledge, given the distribution of labour between foreign and domestic lending activity, there will be a wage discrepancy in favour of labour employed in domestic lending activity. If this discrepancy persists over time due to differences in growth rates of regional knowledge, the intermediary would specialise completely in financing domestic production. The opposite holds when foreign knowledge grows more rapidly.

and Singapore are good examples. These centres played an important role in channelling foreign funds to the economies in the region. Many banking systems in this region also acted as inward transformers attracting both deposits and loans from abroad.

7.4 Conclusion

This chapter builds a model of emergence based on a combination of efficiency and economies of scale in intermediation. We show that in order for an international banking centre to emerge, two demand-side conditions must be met. On the one hand, the centre must be able to fund a critical mass of investment opportunities i.e. the centre must face a sufficiently large demand for loans. Given the small size of some of these centres' economies, the domestic economy is unlikely to have sufficient investment opportunities to generate a sufficiently large demand for loans. Instead, the demand for loans usually arises from regional economies. Because of its geographical proximity and familiarity with the nature of the business in these economies, the regional centre is in a position to finance investment opportunities there. On the other hand, the centre must be able to attract sufficient savings to fund the critical mass of investment opportunities. Again, given the small size of the domestic banking centres' economies, the centre is unlikely to be able to finance foreign operation from its domestic savings. Instead, the centre must attract sufficient funds from countries outside or inside the region. The model can also be used to analyse how the centre evolves over time. Specifically, we show that in the case of complete transferability of knowledge, domestic and cross-border lending activities tend to co-exist. In other words, the intermediary would finance both domestic and foreign production. On the other hand, when transferability of knowledge is

incomplete, a financial intermediary specialises in that activity in which it is more efficient. As a result two extreme cases can emerge by which the financial intermediary either supports domestic production (an extreme case of an inward transformer where the intermediary transforms all foreign inflows into domestic loans) or foreign production (an extreme case of an outward transformer where the intermediary transforms all inflows into foreign loans).

Chapter 8 - Banking Centres and Regional Links: Empirical Evidence

8.1 Introduction

The theoretical model in the previous chapter has stated a major condition for banking centres to emerge. Banking centres must face sufficiently large demand for loans in order for emergence to occur. Since many banking centres' economies are relatively small, we would not expect local economies to generate sufficiently large demand for loans. Instead the demand for loans usually arises from the centre's neighbouring regional economies. Hence, we expect to find some links between a centre's banking activity and regional economic activity.

This chapter provides empirical evidence on the links between Hong Kong's banking development and regional economic activity. We explore this relationship by providing two pieces of empirical evidence. First, we examine the relationship between the number of banks in Hong Kong and regional trade (a proxy for regional economic activity). We expect the large number of banks in Hong Kong to be related not only to Hong Kong's trade activity, but mainly to the region's trade activity. In order to test for this hypothesis, we examine the determinants of banks' location in a single financial centre. This approach has been applied to two markets, the US and the UK (Grosse and Goldberg, 1991; Fisher and Molyneux , 1996). Since these studies deal with global financial centres rather than regional centres, we modify this approach to take into account the regional dimension of banking centres.

Second, in line with the existing empirical literature, we examine the relationship between financial and economic development in Hong Kong. Given that Hong Kong finances both domestic and regional activity, this relationship is not straightforward.

In particular, the various models aimed at assessing the contribution of the banking system to economic development are based on the assumption that the banking system is linked to the domestic economy (Arestis and Demetriades, 1997; Demetriades and Hussein, 1996). Although this feature characterises banking systems of most economies, there are some financial systems in the world that specialise also in financing foreign production and regional trade. This fact is likely to have a bearing on the relationship between economic and financial development.

One major feature of banking centres is the size of their banking system's assets which is usually much larger than the size of their local economies. More importantly, the banking system is likely to be linked with its regional economies. Any empirical analysis that examines the relationship between financial and economic development must take into account these two important features. In order to do this, we need to distinguish between the level of development of the domestic banking system and that of the external banking system. We also need to introduce regional economic activity into the picture. We expect domestic lending activity to be linked with domestic economic activity, but not necessarily with regional activity. On the other hand, we expect external banking development of the centre to be linked with regional economic activity. Hence, we test for two related hypotheses. The first concerns the relationship between domestic economic and financial development. This is in line with the existing empirical literature on finance and development. The second hypothesis concerns the relationship between external lending and regional economic activity. These two hypotheses are tested jointly using cointegration analysis.

This chapter is divided into four sections. Section 2 examines the determinants of the number of foreign banks in Hong Kong. Section 3 examines the relationship between financial and economic development in the case of Hong Kong. Given that the size of the banking system is usually much larger than the size of the domestic economy and the possible links of the centre with the economies in the region, this relationship is not straightforward. We propose in this section a new method to examine such a relationship by differentiating the banking system into domestic and foreign as well as introducing an indicator of regional activity into the analysis. The last section contains my conclusions.

8.2 Determinants of Number of Foreign Banks in Hong Kong

8.2.1 Literature Review

Grosse and Goldberg's study (1991) examines the major determinants of foreign bank presence in the US market. Two dependent variables are used to measure bank foreign presence: The value of foreign banks' assets and the number of foreign bank offices in the United States. Cross-section and time-series data over the period 1980 to 1988 for 35 countries were pooled and the data set was estimated by ordinary Least Squares (OLS). The authors argue that with such a short time period, the assumption that the model's parameters are fixed over time and over country is reasonable. Because the source country may have some unique features that affect their banking presence in the US market, a least-squares dummy variable (LSDV) model was also tested.

The independent variables included in the equation are foreign direct investment (FDI) and portfolio investment into the US; the size of the banking system in the country of origin; a measure of risk and a measure of geographical proximity. FDI is

used to test for the hypothesis that foreign banks follow their "home" borrowers who have expanded in the US market. "Follow the clientele" hypothesis suggests that banks follow their main borrowers abroad in order to defend their market share from domestic and other foreign banks. Hence, it is expected that the higher the level of foreign investment from the origin country to the US, the greater is the presence of banks from the source country in the US. In a similar vein, banks establish in the US in order to service the needs of importers and exporters who undertake trade activities in the US market. The provision of trade-related financial services provide banks with an important source of income in terms of fees and interest payments. Hence, countries with larger trade relations with the US tend to have larger number of foreign bank offices in the US market.

The size of the banking system in the country of origin is expected to affect the volume of financial activity and number of offices in the US. Hence, Grosse and Goldberg (1991) expect that the largest financial centres outside the US, mainly the United Kingdom, Japan and Germany are likely to have a high presence in the US market.

A measure of country risk of the country of origin is included to test the hypothesis that banks operating in less stable financial markets tend to establish in the more stable US market. That is to say that riskier countries are likely to have higher presence in the US market. The authors recognise however that banks with poor credit rating could find it difficult to maintain overseas offices. In particular, since overseas offices are likely to have a heavy exposure to the head office, they may find it

difficult to raise funds abroad. This implies that banks from more stable countries are likely to have higher presence in the US market.

Finally, geographical distance is included in the equation to examine the impact of geographical proximity to the US market on foreign banking presence. The authors suspect that countries closer to the US are likely to have a higher presence in the US since it is less costly for these banks to establish in the US market. Furthermore, it is likely for these banks to be more familiar with the US market. On the other hand, banks require some form of foreign presence in order to provide services to their clients and hence more distant countries are likely to have higher presence in the US market. Because of these two competing effects, the authors do not assign any a-priori sign to this relationship. [1]

Since the independent variables did not show signs of high multicollinearity all the independent variables were included in estimation.[2] The empirical results indicate that the higher the level of foreign direct and portfolio investment in the US, the higher the volume of trade in the US, and the larger the size of the financial sector in the country of origin, the greater is the foreign presence from that country in the US. The study also indicates that the greater the riskiness of the source country, the more likely that these banks would expand their activities in the relatively less risky US market. However, the coefficient on this variable was significant only in one specification and

[1] Both exports and imports were used to measure the volume of trade. The size of the financial sector was proxied by the total demand plus time deposits. The country risk measure was obtained from the Institutional Investor magazine. The countries are ranked according to a scale from 1 to 100 with 100 indicating a very low risk country. The geographical proximity is measured by the number of miles between the country of origin and any of the following three cities: New York, San Francisco and Houston. The number of miles to the closest city is chosen.

[2] Given that Japanese banks account for a large share of foreign banking activity in the US, the original equations were re- estimated excluding Japan from the data set in order to check for the robustness of the estimated equations.

hence it is not possible to reach definite conclusions regarding this variable. The authors argue that this may be due to the measure of risk used (the Institutional Investor series) which does not capture precisely the relative riskiness of countries.[3] Finally, the results indicate that the further the source country from the US, the greater the foreign presence from that country. However, it is important to note that this result is not robust to all specifications.

Fisher and Molyneux (1996) apply the same method to examine the major determinants of foreign bank presence in London. The specification in Fisher and Molyneux's study differs slightly from that of Grosse and Goldberg (1991). The authors argue that the use of banks' foreign assets as a dependent variable is naturally biased towards large banks. As a consequence, regressions that utilise this measure as a dependent variable may be only explaining the decision of large banks to establish overseas offices in London. One way to overcome this problem is to use the number of offices which captures the influence of small banks represented in London.[4] In addition to the number of foreign offices in London, the authors use the number of staff of banks represented by country of origin.[5] Furthermore, the authors make use of an additional independent variable: foreign direct investment out of the UK into the source country. The variable is included to test for the hypothesis that some foreign banks are likely to move into the UK in order to provide services to those corporations which have undertaken investments in its country.

[3] The authors do not explain why the Institutional Investor risk indices are not able to capture precisely the relative country risk.
[4] It should be noted however that the number of offices might understate the importance of large foreign banks operating in London.
[5] This measure is subject to the same problem as foreign banks' assets since it gives greater weight to large banks.

Cross-section and time-series data over the period 1980-1989 for 66 countries were pooled and the model was estimated by ordinary least squares (OLS). The results of the regression are in accord with Grosse and Goldberg's study. The study indicates that bilateral trade, market size, country risk and geographical distance are the major determinants of banking activity in the UK. However, unlike Grosse and Goldberg's study, foreign direct investment indicators are not significant in explaining foreign banking presence in London. When the number of employees is used as a dependent variable, foreign investment out of the UK becomes significant, but again foreign direct investment into the UK is insignificant. The authors argue that this finding indicates that UK foreign investment abroad increases employment of foreign banks which benefit from this investment, but does not necessarily attract other foreign banks whose countries do not entice UK foreign investment.

The authors evaluate the robustness of their results by dividing the sample into two subgroups: European presence (EC) and all-countries' presence minus the US and Japan (ALL).[6] Focusing on the number of firm's equation, only the coefficients on size of home country bank and country risk[7] are consistent with the original specification. The significance and the sign of other variables alter significantly. For instance, in both sub-groups, FDI into the UK is found to have a significant positive impact on the number of offices and number of bank staff in London. On the other hand, the coefficient on foreign investment out of the UK becomes negative and highly significant suggesting that multinationalisation of UK companies may have a negative impact on the number of offices and bank staff in London. Surprisingly, the impact of trade is found to have a negative impact on foreign offices and the number

of bank staff in London. Finally, the coefficient on distance is positive and significant in the ALL equation and negative and significant in the EC equation. The authors argue that the unstable sign on the distance variable may be due to the working of the two competing effects discussed previously.

Despite these mixed results, Fisher and Molyneux (1996) conclude that the size of the banking sector in the country of origin, trade relations and foreign direct investment from European and non US-Japanese sources are important determinants of foreign bank offices and foreign bank employees in London. The authors also conclude that banks in less stable countries are likely to have higher presence in the London market.

8.2.2 Foreign Bank Activity in Hong Kong

This section applies a similar method to examine the determinants of the number of foreign bank offices in Hong Kong. However, unlike the studies reviewed above, this thesis attempts to test few hypotheses related to banking centres, in particular the hypothesis that the large number of foreign banks can not be explained by the level of trade activity of the exporting country with Hong Kong alone, but with the region as a whole. The decision to establish in Hong Kong and not in any other centre can be explained by the relative efficiency and openness of the Hong Kong financial system.

Table 1 presents some evidence on the importance of foreign bank presence in Hong Kong. In 1990, 213 of the top 500 banks in the world had a physical presence in Hong Kong. This number increased to 236 in 1994 and declined to 215 in 1997. These

[6] Since Japan and the US have a large number of foreign banks in London, it would useful to examine the impact of the exclusion of these countries on the regression results.
[7] In the EC equations, the country risk index becomes insignificant.

figures may not necessarily reflect a decline in bank offices, but rather a change in the rank of international banks.

Table 8.1 - Presence of World's Largest 500 [2] Banks in Hong Kong
(End of December 1997)

World Ranking [1]	1990	1991	1992	1993	1994	1995	1996	1997
1~20	18	19	19	18	19	19	19	19
21~50	26	22	24	26	28	27	26	26
51~100	37	34	35	37	38	39	36	36
101~200	55	53	53	58	65	57	57	51
201~500	77	78	80	71	86	86	75	83
Sub Total	213	206	211	210	236	228	213	215
Others	110	107	99	101	93	109	121	122
Total	323	313	310	311	329	337	334	337

Key:
(1) Top 500 banks in the world ranked by total assets less contra items.
(2) The figures exclude banks incorporated in Hong Kong
Source: Hong Kong Monetary Authority Annual Report 1997

A broader measure is the number of overseas banks in Hong Kong. Hong Kong's financial system is made up of three different types of financial institutions: Licensed banks, Restricted License banks (RLBs) and Deposit-Taking Companies (DTCs). These are collectively known as authorised institutions under the Banking Ordinance. Licensed banks provide all types of financial services and are the only financial institutions that can offer current and saving accounts and accept deposits of any size and maturity. RLBs are mainly investment and merchant banks engaged in securities underwriting and capital market activities. RLBs can only accept deposits in large denominations (not less than HK$500,000). DTCs are mainly finance companies which engage in specialised activities such as consumer finance, small and medium companies finance, trade finance and securities business. DTCs can only accept deposits of $100,000 or larger with an original term of maturity of at least three months. Unlike Singapore, Hong Kong's financial system is not differentiated in the sense that banks with licences can operate in the offshore and onshore market without any restrictions.

By the end of 1996, 337 foreign banks had some form of representation in Hong Kong.[8] Japan has by far the largest representation in Hong Kong. By the end of 1996, Japan had 92 banks, followed by China (35), Indonesia (20) and South Korea (19). Germany has the largest European representation in Hong Kong (16), followed by France and the UK (12). The presence of US banks in the Hong Kong market is also substantial with a total of 32 bank offices. Notice that despite Hong Kong's success in attracting a large number of bank from all over the world, Asian banks constitute the largest share of the HK market (about 70%) in terms of the number of overseas banks. This reflects in a sense the regional nature of Hong Kong's banking market.

Table 8.2 - Foreign Banks in Hong Kong by country of Origin *(end of 1996)*

	License Banks	*Restricted License Banks*	*Deposit Taking Companies*	*Total Number of Banks in Hong Kong*
Australia	4	0	0	4
China	18	3	14	35
India	4	0	3	7
Indonesia	3	1	16	20
Japan	46	11	35	92
Malaysia	3	2	3	8
Pakistan	1	0	2	3
Philippines	2	1	6	9
Singapore	6	2	2	10
South Korea	3	6	10	19
Thailand	1	4	1	6
Vietnam	0	0	1	1
Austria	2	0	0	2
Belgium/Luxembourg	3	0	0	3
Denmark	1	0	1	2
France	9	3	4	16
Germany	10	1	1	12
Italy	6	0	0	6
Netherlands	3	2	0	5
Spain	3	0	0	3
Sweden	2	0	0	2
Switzerland	3	1	0	4
UK	7	4	1	12
Bahrain	1	0	1	2
UAE	0	1	1	2
Canada	6	1	1	8
USA	14	11	7	32
South Africa	0	3	1	4

Source: Hong Kong Monetary Authority Annual Report 1997

[8] The main objective of this section is to explain the major determinants of bank offices in terms of bilateral and regional trade. Given that there are no restrictions on banks' funding activity and no restrictions on any type of banks when dealing with non-resident borrowers, the focus should be on total number of banks rather than only on one type of banks.

The regional role of Hong Kong becomes more evident when we examine the external position of Hong Kong's financial system against geographical regions. In 1997, net external claims against Asia and the Pacific vis-à-vis all sectors amounted to HK$ 550 billion. The bulk of net external claims are against Japan, China, South Korea and Thailand. It is interesting to note that Japan is the major supplier of funds to banks in Hong Kong. These funds are mainly intermediated through the interbank market. Despite this fact, Hong Kong still has a total net claims of HK$229 billion against Japan. This position is achieved through lending heavily to non-bank customers in Japan. In a sense, there is a circular flow of funds by which Hong Kong attract funds from Japan through the interbank market and then re-lends these funds to Japanese non-bank customers. In the Asia and Pacific region, Singapore and to a lesser extent Macau and Vanuatu are net suppliers of funds to Hong Kong.[9] Unlike the Japanese position, both banks and non-banks in these economies channel funds to Hong Kong.

[9] The position of Singapore against Hong Kong reveals two important facts. First, there is some sort of regional specialisation between the two centres each providing services to its neighbouring economies (Malaysia and Indonesia in the case of Singapore and China, Japan and South Korea in the case of Hong Kong). Second, it seems that there is some sort of functional specialisation between the two centres with Singapore acting as a funding centre (attracting funds to the region) while Hong Kong acting as an arrangement centre (arranging loans to the region). This functional specialisation may be the result of differences in regulatory environment during the 70's. Until the early 80's, Hong Kong imposed a withholding tax on interest income while banks' income from offshore operations was exempted from taxes. Singapore, on the other hand, did not impose any withholding tax, but maintained a 10% tax on banks' offshore income. Thus, a bank can minimise its tax liability by depositing funds in Singapore and arranging loans from Hong Kong. However, the complementarity between the two centres ceased to exist in 1982 when Hong Kong abolished its withholding tax on

Table 8.3 – Geographical Distribution of External Assets of Banks in Hong Kong vis-à-vis Banks and Non-Banks *(end of 1997, in billions of HK$)*

	Net claims on (Liabilities to) Banks outside Hong Kong	Net claims on (liabilities to) non-bank customers outside HK	Total net claims (liabilities)
Asia and Pacific	***-1105***	***1655***	***550***
Japan	-1288	1517	229
South Korea	54	53	107
Mainland China	47	54	101
Thailand	57	25	82
Australia	36	11	47
Indonesia	5	16	21
New Zealand	10	10	20
Taiwan	32	-15	17
Philippines	6	4	10
India	0	8	8
Malaysia	-1	3	2
Vanuatu	-4	-3	-7
Macau	-15	-4	-19
Singapore	-41	-25	-66
Others	-4	0	-4
North America	***-16***	***27***	***11***
Canada	4	14	18
United States	-20	13	-7
Caribbean	***-69***	***-178***	***-247***
Panama	-1	18	17
Bahamas	14	0	14
Bermuda	-1	5	4
Netherland Antilles	0	-57	-57
Cayman Islands	-81	-122	-203
Others	-2	-21	-23
Western Europe	***-276***	***-15***	***-291***
Italy	1	7	8
Sweden	0	4	4
Switzerland	4	-1	3
Finland	0	1	1
Denmark	-3	2	-1
Austria	-9	0	-9
Germany	-30	12	-18
Luxembourg	-25	0	-25
Netherlands	10	-46	-36
Belgium	-47	3	-44
France	-65	5	-60
United Kingdom	-105	-9	-114
Middle East	***-15***	***-2***	***-17***
Bahrain	-2	-1	-3
Saudi Arabia	-3	0	-3
UAE	-8	-1	-9
Others	-2	-2	-4

Source: Monetary Authority of Hong Kong Annual Report 1997

foreign currency deposits. Singapore retaliated by abolishing taxes on income derived from the arrangement of syndicate loans in Singapore.

The fact that the bulk of external liabilities and most of external claims are against economies in the region reflects the regional role of Hong Kong . In particular, Hong Kong plays an important role in channelling foreign capital to the region through arrangement, syndication and management of Eurocredits to Asia Pacific borrowers. Most of the capital is attracted from the western world. This can be seen by examining the position of banks in Hong Kong against the rest of the world. Western Europe, the Caribbean, and the Middle East are important net suppliers of funds to banks in Hong Kong. The Cayman Islands and the United Kingdom are by far the major supplier of funds to Hong Kong.[10] In Western Europe, France, Belgium and Netherlands are also important net suppliers of funds

2.3 Empirical Model, Method of Estimation, Data and Empirical Results

The main objective of this section is to examine empirically the major determinants of the number of foreign banks in Hong Kong. The general method used in this chapter is similar to that of Grosse and Goldberg (1991) and Fisher and Molyneux (1996) with few major differences. Unlike Gross et al (1991) who examine banks' location in the world's biggest and most dynamic economy, this chapter focuses on a small open economy. This difference has an important implication on the empirical model. For instance, the mere size of the US market is an attractive feature for a large number of banks. The US market provides foreign banks with profitable and risk diversification opportunities. Second, unlike Fisher et al' study (1996) which deals with a global centre, this study deals more with a regional centre. The regional aspect is important

[10] This reflects the high interconnectedness among international financial centre's and banking centre's and among banking centre's themselves. This may suggest that these centres are not competitors after all, but form a network aimed at expanding the circuit of capital all over the globe giving banks opportunities to diversify their activities and minimise their tax structure.

for explaining the major determinants of Hong Kong's competitiveness as it may depend on the economic performance of the whole region rather than that of Hong Kong alone. This entails the use of a different list of independent variables. In particular, this section tests for the hypothesis that regional economic activity is the major determinant of the number of foreign offices in Hong Kong.

Empirical Model

Many empirical studies have suggested that trade activity is a major determinant of international banking activity. In fact, Chapter 6 shows that trade connections between economies are likely to cause banks to establish offices in each other's jurisdiction. However, when examining banking centres, one additional insight must be taken into account. Because of its regional nature, banks tend to establish in Hong Kong in order to provide financial services for its regional clients rather than its Hong Kong clients. In other words, the number of banks is not determined by trade connections with Hong Kong alone, but rather by trade relations with the entire region. This has one important implication for the empirical model. Instead of using only a bilateral trade variable, a more broad measure of regional trade should also be included. Hence, two trade variables are included. The first is the level of exports between the home country and Hong Kong. This variable is the same one used in the reviewed studies. The additional trade variable is the level of exports between the home country and Asia and the Pacific region. Significant positive coefficients on both variables suggest that foreign banks provide services both for the local and regional economy. A positive significant coefficient on the latter suggests that banks establish in Hong Kong mainly to finance their regional operations.

In addition to these variables, the thesis examines the impact of the rest of the explanatory variables suggested by Grosse and Goldberg's study (1991). This allows us to draw comparisons with other papers. First, the market size of the source country is included to test for the hypothesis that countries with larger banking system are likely to have higher foreign presence in Hong Kong. The ratio of the total volume of demand and time deposits in the source country to GDP is used as a proxy for the size of the domestic banking system. Second, a dummy variable which takes a value of 1 for the Asia - Pacific countries in included to test for the hypothesis that a banking centre is more likely to attract large number banks from regional economies. As Goldberg et al (1990) notes, it may be less costly for these banks to establish in the Hong Kong market or it may be the case that Asian banks are more familiar with Hong Kong market. Furthermore, as emphasised by Park (1982,1988) regional centres play an important role in regional payment clearing. This may be responsible for attracting banks to establish in regional centres. Finally, a measure of source country risk is included to test for the hypothesis that banks tend to diversify their activities into less risky markets. This may have some relevance for London, or US but not necessarily for Hong Kong, especially that many source countries (all developed countries and many Asian Countries) are less risky than Hong Kong. Hence, it is not expected for this variable to carry a negative sign or add any explanatory power to equation. The index for country risk used is the one suggested by the institutional investor magazine.[11] The table below describes the list of independent variables and data sources.

[11] Due to data limitations, foreign investment related variables are not included in the equation.

Table 8.4 - Description of Variables and Data Sources

Dependent Variable	**Proxy measures**	**Sources**
Foreign Bank Presence	Number of Foreign Banks from Home country in Hong Kong	Hong Kong Monetary Authority Annual Reports, Various Issues
Independent Variables		
Exports to Hong Kong	Exports between source country and Hong Kong	IMF International Financial Statistics Year Book, 1997
Exports to Asian and Pacific region	Exports between source country and Asia	IMF International Financial Statistics Year Book, 1997
Source Country Market Size	Total demand, savings and time deposits	IMF, International Financial Statistics, Various Issues
Source Country Risk	Index of country risk	Institutional Investor Magazine
Geographical Proximity	A dummy variable that takes a value of 1 for Asian and East Pacific countries and zero otherwise	

Method of Estimation

Data for the dependent and independent variables were collected for a sample of 28 countries over the period 1990-1996 which gives us a maximum of 217 usable observations. This is compared to Fisher and Molyneux's study which uses only 157 observations and Grosse and Goldberg's study which uses 228 observations in the final estimations. From all the countries that have some form of representation in Hong Kong, only South Africa and China were excluded from the data set. The former country was excluded due to data limitations while the latter was excluded since it was felt that Hong Kong and China should not be treated as two separate countries.

Since our data set contains only a few periods and relatively large cross section units, estimation techniques which focus on cross sectional variation or heterogeneity are more useful in this context (Greene, 1993).

However, this should not cause a major concern. However, many empirical studies (including mine in chapter 6) have shown that FDI is not a major determinant of the location of banks.

A basic regression model would take the following form:

$$y_{it} = \alpha + \mu_i + \beta x_{it} + \varepsilon_{it}$$

Where x contains K regressors *not including the constant term*, ε is the error term, and $\alpha + \mu_i$ is the *individual* effect specific to individual cross section unit, i.[12] If we make the assumption that parameters are fixed over time and across units, then OLS yields consistent and efficient estimates of α and β. In this case, cross-section and time-series data are pooled and then the data set is estimated by ordinary least squares. However, it is possible that the source country may have some unique features that affect their banking presence in Hong Kong. In this case, it is important to capture the differences across units, otherwise OLS would not yield the most efficient estimates. One possible formulation is to assume that differences across units can be captured by the constant term. The least-square dummy variable (LSDV) model, which consists of running the original equation with dummy variables for each cross section unit, allows for such an exercise. The LSDV takes the following form

$$y = D\alpha + X\beta + \varepsilon$$

Where D is the matrix of dummy variables with dimension of nT * n. It is possible to devise an F-test that compares the restricted sum and unrestricted residual sum of squares in order to test whether the constant terms are equal across units. Rejecting

[12] The appropriate estimation procedure depends on the assumptions made about μ_i. If μ_i is assumed to be fixed, the model used is the least square dummy variable. On the other hand, if μ_i is assumed to have a random distribution, then the model used is the error component model.

the null hypothesis that the constant terms are equal across units justifies the use of the LSDV model despite the fact that this model entails a loss in the degrees of freedom.

It is important to note that the above specification assumes that μ_i are fixed. An alternative specification, the error component model, treats μ_i as random variables with $E[\mu_i] = 0$ and $E[\mu_i] = \sigma^2_\mu$. If μ_i are random, then using the additional information increases the efficiency of the estimator. Hence, it is important that we choose the most efficient estimator. Given the nature of our data set, it is very reasonable to assume that μ_i are fixed. As Greene (1993) notes, the random effect model is a reasonable approach when the sampled cross-sectional units are drawn from a large population. In this case, it is appropriate to consider the individual specific constant terms as randomly distributed. On the other hand, when the sample is exhaustive such that it includes all or most cross-sectional units, then the fixed effect model is more appropriate. Since our data set include all the countries that have overseas offices in Hong Kong, the fixed effects model seems appropriate.[13]

In a recent work, Pesaran and Smith (1995) argue that pooled estimators may not produce consistent estimates. When the regressors are serially correlated, this is likely to produce serial correlation in the disturbances if the heterogeneity of the coefficients is assumed. As a result, the model may generate inconsistent estimates. However, this discussion is mainly applied in the context of dynamic models that include lagged

[13] There is an additional reason for why the fixed effect model is more appropriate in this setting. Given that n is not sufficiently large, it is not possible to provide a reliable estimate of σ^2_μ . As a consequence, the random effect model would yield inconsistent estimates (Judge et al, 1985). Furthermore, the Random effects model is based on the assumption that X and μ_i are not correlated. If this assumption

dependent variables which is not the case in our model. Interestingly, the authors find that cross-section regressions when based on time series averages do produce consistent estimates. In order to test for the robustness of the empirical results to the method of estimation, a cross sectional model based on time averages is also tested.

Model Specification and Regression Results

The basic model specification to be estimated is the following:

$$NOB_{ij} = a_0 + b_1 EXP_{ij} + b_2 EXP_{ir} + SIZE_I + \varepsilon_i$$

Where NOB_{ij} is the number of foreign offices from country i to Hong Kong ; EXP_{ij} is the value of exports from country i to Hong Kong; EXP_{ir} is the value of exports from country i to the Asia - Pacific region minus exports to Hong Kong;[14] Size is the size of the banking system in the country of origin proxied by the size of total deposits, ε_i is the error term.

Table 5 reports four different models of the major determinants of bank's location in Hong Kong. In Model A, time series and cross section data are pooled and OLS procedure is applied. Both the US and UK studies reviewed above use this estimation procedure. The empirical results show that while regional export activity is an important determinant of the number of banks in Hong Kong, bilateral exports seem to have no significant impact. The size of the banking system in the country of origin also has a significant positive impact implying that countries with large financial

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does not hold, then the Random effect model would result in biased estimates. On the other hand, the dummy variable approach does not need to make this assumption (Greene, 1993; Chamberlain, 1978).

[14] One would expect to find a high correlation between EXP_{ij} and EXP_{ir}. However, the correlation coefficient between these two variables is only 0.54.

system are likely to establish overseas offices in Hong Kong. In fact, according to Model A, the size of the financial system and regional exports explain more than 90% of the variation in the number of banks. Because the Goldfeld-Quandt and Breuch-Pagan tests for heteroscedasticity produce conflicting results, the model is estimated using generalised least squares (Model B). As can be noticed from the table below, Model B produces similar results to model A, except that the coefficient on the size of financial system in country of origin becomes slightly smaller in Model B.

Given that the source country may have some specific features concerning its relationship with Hong Kong or the region, it is important that we specify another model. This is done in Model C where the equation is estimated using the LSDV model. This method assumes that the differences across countries can be captured in differences in the constant term. It is possible to devise an F-test that compares the restricted sum and unrestricted residual sum of squares in order to test whether the constant terms are equal across units. Based on this test, the null hypothesis that constant terms are equal across units can be rejected at the 1% level.[15] Model C produces similar results to models A and B with two major differences. The coefficient on exports to Hong Kong remains negative but now becomes significant at the conventional levels. Second, the coefficient on regional exports becomes much smaller but still retains the same sign and significance. The coefficient on the size of the financial system does not alter much when compared to model B.[16]

[15] The F-calculated is F(27,165) = 95.37 which is highly significant.
[16] It is interesting to note all the country specific dummies (not reported below) are significant, except for Ireland, Norway and New Zealand.

Table 8.5 – Determinants of Foreign Banks' Location by Country of Origin in Hong Kong[1]—*(Sample:1990-1996, 28 countries)*

Regressors	Model A[2]	Model B[3]	Model C[4] (LSDV)	Model D (LSDV)
Intercept	2.381*	1.255*	-----	-----
$Size_i$	0.011*	0.008*	0.006*	0.006*
Exp_{ir}	0.252*	0.264*	0.114*	0.113*
Exp_{ij}	-0.221	-0.079	-1.23*	-1.23*
$DRisk_{ij}$	-----	-----	-----	0.010

Key:
(1) The dependent variable is the number of bank offices from country of origin to Hong Kong.
(2) Model A is estimated using ordinary least squares (OLS).
(3) Model B is estimated using generalised least squares (GLS).
(4) Model C is the least square dummy variable model (LSDV). Based on an F-test, we can reject the hypothesis that the constant terms are equal are rejected at the 1% level, hence we use LSDV model. All the country specific dummy variables are significant except for Norway, Ireland, and New Zealand.

* Significant at the 1% level.

Finally, Model D uses the least squares dummy specification but also includes the index for risk obtained from the Institutional Investor magazine. This variable does not add much to the explanatory power of the estimated equation. As mentioned somewhere else in this chapter, this factor can explain the expansion of banks into the US, but may be expected to be less decisive in explaining the location of banks in regional centres.

In order to evaluate the robustness of the results with respect to the method of estimation, data are averaged over the period and then estimated using OLS or GLS. According to Pesaran and Smith (1995), this method produces consistent estimates of the average long run coefficients. Table 6 reports the cross-section regression results. Since the Goldfeld-Quandt and Breuch-Pagan tests for heteroscedasticity produce different results, the equation was estimated using both OLS (Model A) and GLS

(Model B). As can be inferred from table 6, the results using cross sectional analysis are similar to those obtained previously. The size of the banking system in the country of origin has a significant positive coefficient implying that countries with a large financial system are likely to establish overseas offices in Hong Kong. The size of the coefficient does not alter much. The empirical results also show that while regional export activity is a major determinant of the number of banks in Hong Kong, bilateral exports seem to have no significant impact. Notice that the coefficient on regional exports is higher than the coefficient obtained in the previous estimations. In addition to Models A and B, Model C which includes a dummy variable for Asian countries is included to test for the hypothesis that a regional banking centre is more likely to attract a large number banks from regional economies. The coefficient on the dummy is positive and highly significant indicating that regional economies are likely to establish offices in Hong Kong. This could be the case because banks are more familiar with the Hong Kong market or because such centres play a central role in regional payment clearing attracting a large number of banks from the region. In model D, the index for risk is included in the equation. Again, this variable seems to play no role in explaining the number of foreign banks in the Hong Kong market.

Table 8.6 – Determinants of Foreign Banks' Location by Country of Origin in Hong Kong[1] *(Average of the 1990-1996 period, 28 countries)*

Regressors	Model A	Model B	Model C	Model D
Intercept	1.781**	1.183**	0.252	0.789
$Size_i$	0.008*	0.008*	0.012*	0.011*
Exp_{ir}	0.365*	0.370*	0.203**	0.265*
Exp_{ij}	-0.10	-0.11	-0.032	-0.044
Dummyasia	-----	------	2.694**	1.304
DRISK	-----	------	------	-0.048

(1) The dependent variable is the number of bank offices from country of origin to Hong Kong.
(2) Model A is estimated using ordinary least squares (OLS).
(3) Model B is estimated using generalised least squares (GLS).
* Significant at the 1% level.

All the results taken together clearly indicate that regional trade is a major determinant of foreign banks' location in Hong Kong. Bilateral trade with Hong Kong alone is insignificant in explaining the number of banks, which reflects the regional nature of Hong Kong. The results are highly robust to the specification and the method of estimation being used. Other significant variables are the dummy for Asia and the size of the exporting economy. The index for risk does not add any explanatory power to our equation and hence was dropped from the equation. These results are quite different from the ones obtained by Grosse and Goldberg (1991) and Fisher et al (1996). These differences mainly arise due to the different nature of the financial centres that are being examined. This exercise makes clear that the sources of each centre's competitiveness are different. Despite the possibility of identifying some common sources, generalisations on the determinants of competitiveness of financial centres can lead to erroneous conclusions.

8.2.4 Time series analysis

In this section, cointegration analysis is used to examine the long run relationship between the number of banks in Hong Kong and regional trade. If we can reach similar conclusions using a different method of estimation and different data set, then we can be more confident about the obtained results. Furthermore, cointegartion analysis has an additional advantage since it allows us to address the issue of causality. After all, it could be the case that regional trade is affected by the number of banks rather than the other way around or there may be a reverse causality by which banks and regional trade reinforce each other.

Since we are interested only in the relationship between regional trade and number of banks in Hong Kong, we utilise two variables employing quarterly data for the period 1975-1996. These two variables are the logarithm of real exports and logarithm of total number of banks in Hong Kong. First, we test for the unit roots in the data. Then we estimate the VAR and test for cointegration. The vector(s) is then normalised to the variable which shows a strong evidence of error correction. Finally, we test for weak exogeneity of the variables and test whether all the variables should be in the system. This analysis is carried in the table 7.

Both the trace and the eigenvalue statistics indicate the existence of one cointegrating vector which suggests that there is a long run relationship between the number of banks in Hong and regional exports. The interpretation of the cointegrating vector is straightforward. It shows a positive relationship between number of banks and regional exports. The cointegrating vector also shows that regional export activity is

weakly exogenous to the system which suggests that our use of the number of banks as dependent variable in the cross section analysis is very sensible.

Table 8.7 -Total Number of Banks and Regional Trade (Cointegration Analysis)

Variables entered
LREXPORT = Logarithm of regional exports
LNOB= Logarithm of total number of banks

Lag Length of VAR = 8 (Based on Sim Likelihood Ratio Test)
Sample period: 1975 Q1 - 1996 Q4

Ho: Rank = p	Trace Statistics		Eigenvalue Stat
P=0	30.16*	P=0	25.09*
P <=1	5.07	P=1	5.07

System exogeneity test: Chi Squared (1)	LR test	p-value
LNOB exogenous to the system	19.54	0.00
LREXPORT exogenous to the system	0.40	0.53

Cointegrating Vector
Vector: LNOB = 1.441** + 0.126 LREXPORT**
*significant at the 1% level, **significant at the 5% level

8.2.5 Hong Kong's Funding Activity

Based on different methods of estimation, it is possible to conclude that the ability of Hong Kong to attract banks is directly linked to regional trade. The next step is to consider whether Hong Kong funds regional trade. In order to do that, we need to examine the external position of Hong Kong banks against economies in the region and test whether there is a relationship between Hong Kong's external assets and regional trade. This relationship is first tested using time series data against individual countries in the region. The monetary authority of Hong Kong provides a geographical breakdown of the external assets/liabilities vis-à-vis individual countries which helps us examine the sources and uses of funds. Unfortunately, annual data are available only from 1984. Given the small size of the sample (12 observations), it is not possible to apply time series analysis. Instead, the analysis is limited to plotting two series (banks' external position and country' trade) and examine their movements

during the last 10 years. This relationship is then tested more rigorously by pooling data from different countries and then estimating a simple equation relating regional lending to regional trade and regional GDP. The last variable is included to test whether Hong Kong also funds regional investment opportunities.

The graphs in appendix I plot Hong Kong's external assets against China, Indonesia, Thailand, Malaysia and Korea[17] and the volume of trade in each of these economies (both expressed in US dollars). As can be noticed, in most of these economies, Hong Kong's external assets and trade tend to move together. This is most obvious in the case of China and Indonesia. A similar trend can also be observed in Korea and Thailand although in Malaysia this trend is not very evident. Also notice the difference among countries in the volume of Hong Kong's external assets relative to their total trade. While this ratio is relatively high in case of China and Thailand (more than 10%), it is quite small in case of Malaysia (2%).

We provide more rigorous analysis to test whether Hong Kong's regional lending is related to trade. To do that, we pool data from 7 economies over 12 years and estimate a simple equation. In this equation, the dependent variable is the size of external assets of Hong Kong banks within the 7 regional economies. The independent variables are regional trade and regional GDP. Since these two variables are highly correlated, they are not included in the same equation. As can be seen from the table below, the coefficient on regional trade is positive and highly significant indicating that regional trade is an important determinant of the volume of external lending. In fact, regional trade explains 79% of the variation in external assets against these

[17] These countries are chosen according to the importance of the size of their external assets.

regions. Since regional GDP and regional exports are highly correlated, we expect to obtain similar results with regards to regional GDP. In fact this is reflected in the table below where the coefficient on regional GDP is the same although it explains 71% of variation in external assets against the region.

Table 8.8 - Determinants of Hong Kong's External Assets
(Pooling data of 7 countries over 12 years, Cross section analysis)

Regressors	Model A	Model B
Intercept	-6.99*	-27.15*
Regional Trade	1.37*	____
Regional GDP	____	1.37*
Adjusted R2	0.79	0.71
F-Test	385.04*	249.78*

Notes
1. The dependent variable is the size of external assets of Hong Kong against Indonesia, Thailand, Malaysia, Korea, India, Philippines, Australia and New Zealand.

8.3 Financial and Economic Development in the Case of Hong Kong

Following the existing empirical literature on finance and development (Demetriades and Hussein, 1996; Arestis and Demetriades, 1997), we examine the relationship between financial development and economic development in the case of Hong Kong. Various empirical studies have analysed this relationship using cross-section analysis (King and Levine, 1993; Levine and Zervos, 1996). Despite its wide application, this method of estimation suffers form many shortcomings, especially since those studies do not address adequately the issue of causality (Arestis and Demetriades, 1997). In this chapter, we use cointegration techniques to analyse the relationship between banking and financial development in Hong Kong. However, unlike existing studies we take into account the special features of financial centres, in particular the fact that a banking centres' financial development is linked to its regional economies and that

these links can run in both directions i.e. regional economic development contributes to centre's financial development or banking centre could contribute to regional economic activity. Therefore, in addition to a measure of domestic economic development, we include an indicator of regional economic activity.

8.3.1 Method of Estimation

We test for the proposed hypotheses using cointegration analysis. The first step in any application of cointegration techniques is to establish the order of integration of the variables concerned. To do that, all the variables are pre-tested for the presence of unit roots using the Augmented Dickey Fuller test. If we find that the variables are of the same order, the next step involves testing whether these variables are cointegrated. In other words, we need to examine whether there is a long run stable relationship among the variables concerned. This is done using the Johansen methodology (1988). This method is chosen because there is evidence that the Engle-Granger approach suffers from some problems in finite samples. For instance, Phillips and Durlauf (1986) show that asymptotic distribution of the OLS estimator and its associated test statistics are not normal and hence inferences about the significance of the parameters of the long run equation can not be made. Another problem is related to the issue of whether cointegration tests based on the residuals from long run OLS estimation have good power properties. In fact, despite the many attempts to modify the OLS estimator (Phillips and Hansen, 1990), it is generally agreed that estimates of the long run relationship can result in biased estimates (Inder, 1993). Due to these problems and the existence of evidence that the Johansen technique performs better than single equation estimation (Gonzalo, 1994), the Johansen method was chosen.

As a preliminary to the Johansen procedure, it is important to determine the lag length to be used in the VAR model. The sensitivity of the Johansen technique to the (VAR) length is very well known. In order to determine the appropriate lag length, Sim's (1980) likelihood ratio test is used. This test involves examining cross equation restrictions. Sim's likelihood ratio has a Chi-square distribution with degrees of freedom equal to the number of restrictions in the system. It is important to check that whether with the lag structure obtained from applying Sim's likelihood ratio, the residuals approximate white noise.

We test next for the weak exogeneity of each of the variables in the system. The test for causality is essentially a test of the statistical significance of the lagged cointegrating vector (Johansen, 1992). This involves testing whether the speed of adjustment coefficient (α) is significantly different from zero. If α related to variable x_1 is zero, then this means that when estimating the parameters of the model, there is no loss of information of not modelling the Δx_1. Hence, this variable is weakly exogenous to the system and could be transferred to the right hand side of the VAR model. This restriction is maintained in the system in case we find that the variable is exogenous to the system. Next, we test the zero restriction on the parameters of the cointegrating vector. These tests are carried sequentially and in cases where we do not reject the null, the variable is dropped from the equation. Finally, we impose restrictions on the contegrating system in order to reduce the system into interpretable economic relationships (Peseran and Shin, 1995).

8.3.2 Empirical Results

We start our analysis by examining the relationship between a broad measure of financial development, which includes the ratio of external and domestic lending to GDP, and economic development proxied by real GDP. We test for the existence of a stable relationship between these two series using the Johansen procedure (Table 4). Using a variety of lag structures, we can not reject the null hypothesis of no cointegrating vector. This result implies that there is no stable relationship between broad financial development and domestic economic development. In fact, this is partly reflected in the size of the banking system which is six times larger than the size of the domestic economy. Despite the fact that Hong Kong experienced rapid economic growth, such economic performance alone can not explain the high level of Hong Kong's financial development. In other words, broad financial development needs not be solely attributed to economic trends within Hong Kong itself.

Table 8.9 - Financial and Economic Development in Hong Kong (Johansen Procedure)
(Sample period: 1975 Q1 - 1996 Q4)

Variables entered
LBCLAIMY = Logarithm of the level of domestic claims and external claims to nominal GDP
LRGD= Logarithm of real GDP

Lag Length of VAR = 8 *(Based on Sim Likelihood Ratio Test)*

Ho: Rank = p	Trace Statistics	Eigenvalue	Stat
P=0	13.05	P=0	9.85
Lag Length of VAR = 12			
P=0	17.70	P=0	9.53

Due to the special features of Hong Kong, it is clear that the relationship between financial and economic development need to be approached in quite a different manner. An alternative approach should distinguish between domestic and external lending activity as well as introduce regional economic activity to the analysis. We do this by including four variables in the cointegration analysis. We differentiate between

the extent of domestic financial development, measured by claims on private sector in Hong Kong to nominal GDP, and external financial development, measured by external claims on non-banks to nominal GDP. In addition to real domestic GDP, we include the level of regional exports to proxy the level of regional economic activity. While domestic economic and financial development are likely to be linked, external financial development is likely to be linked with regional economic activity, proxied in the analysis by the region's exports to the rest of the world.

Data for claims on private sector and external claims were obtained from *Hong Kong Monthly Digest of Statistics* (various issues). Nominal and real GDP data were obtained from *Census and Statistics Department, Estimates of GDP 1961 to 1995* and Hong *Kong Monthly Digest of Statistics* (various issues). Data for regional exports were obtained from *IMF, International Financial statistics* (CD-ROM 1998:6).

The results of applying DF and ADF to the level of variables series indicate that the null hypothesis of a unit root can not be rejected for the level-series. Applying the DF and ADF test on the first differenced series indicates that the null hypothesis can be rejected at conventional levels and hence we conclude that all the variables are integrated of degree 1. Table 10 reports the maximal eigenvalue and the trace statistics which suggests the existence of two cointegrating vectors at the 5% level. Hence, a cointegration rank of two is imposed on the system and further tests are carried out. First, we test for the weak exogeneity of the each of the variables in the system which correspond to the notion of long run causality (Johansen, 1992). Tests for weak exogeneity on each of the variables show that none of the variables is weakly exogenous to the system at the 10% level and hence, no restrictions are

imposed on the system. Next, we test for zero restrictions on parameters of the cointegrating vectors. These tests show that none of the variables should be excluded from the system. Finally, we impose restrictions on the cointegrating system in order to reduce the system into interpretable economic relationships (Peseran and Shin, 1995).

After imposing restrictions on the β vectors, we obtain the two cointegrating vectors shown in table 10 below. The estimates show some interesting results. The first cointegrating vector shows that the level of domestic financial development (or the extent of domestic financing) is positively linked to the level of economic development with causality running from the latter to the former. This piece of evidence is consistent with the existing empirical literature which persistently reports a stable relationship between financial and economic development although the direction of causality can differ across countries (Demetriades and Hussein, 1996; Arestis and Demetriades, 1997). More interestingly, this result clearly shows that in the context of financial centers, it is important to differentiate between the domestic and external lending activity of the center. A broad measure of financial development based on these two aspects of lending activity can not be solely attributed to economic trends within Hong Kong itself and hence we are unlikely to find an overall meaningful relationship between financial and economic development. On the other hand, if we consider a narrower measure of financial development based on domestic lending activity only, then we are likely to find links between the level of domestic economic development and banking activity.

Table 8.10 - Financial and Economic Development in Hong Kong (Johansen Procedure)
(Sample period: 1975 Q1 - 1996 Q4)

Variables entered
LDOMCLAIM = Logarithm of the ratio of claims on domestic private sector to nominal GDP
LEXTCLAIM = Logarithm of the ratio of external claims to nominal GDP
LRGDP = Logarithm of Hong Kong's GDP in real terms
LREXP = Logarithm of regional exports in real terms

Lag Length of VAR = 8 (Based on Sim Likelihood Ratio Test)

Ho: Rank = p	Trace Statistics		Eigenvalue Stat
p=0	115.42*	p=0	75.93*
p<=1	39.49**	p=1	24.60**
p <=2	14.90	p=2	12.17

Analysis assuming two cointegrating vectors

System exogeneity test: *Chi Squared (2)*	LR test	p-value
LDOMCLAIM exogenous to the system	36.63	0.00
LEXTCLAIM exogenous to the system	6.55	0.04
LRGDP exogenous to the system	14.46	0.00
LREXP exogenous to the system	9.01	0.01

Exclusion of variables in the long run *Chi Squared (2)*	LR test	p-value
LDOMCLAIM included in the system	38.62	0.00
LEXTCLAIM included the system	26.88	0.00
LRGDP included in the system	31.66	0.00
LREXP included in the system	5.94	0.05
Constant included the system	39.54	0.00

2 Cointegrating Vectors:
LDOMCLAIM = -21.330* +2.261 LRGDP*
LEXTCLAIM = -19.019 + 2.172 LDOMCLAIM* + 0.704 LREXP**

	LR test	p-value
Joint test on all restrictions:*Chi-squared* (1)	0.95	0.33
	T- test	p-value
LRGDP exogenous to the first vector	3.870	0.00
LDOMCLAIM exogenous to the second vector	7.128	0.00
LREXP exogenous to the second vector	1.231	0.20

*significant at the 1% level ; ** significant at the 5% level

The second cointegrating vector reveals some interesting observations regarding regional trade activity and Hong Kong's external lending activity. The results show that external banking development (or the extent of external lending activity) depends positively on the region's trade activity. The second cointegrating vector also shows a positive relationship between the extent of domestic and external lending activity with causality running in both directions. In the context of the model of chapter 7, this evidence is consistent with complete transferability of knowledge in which the

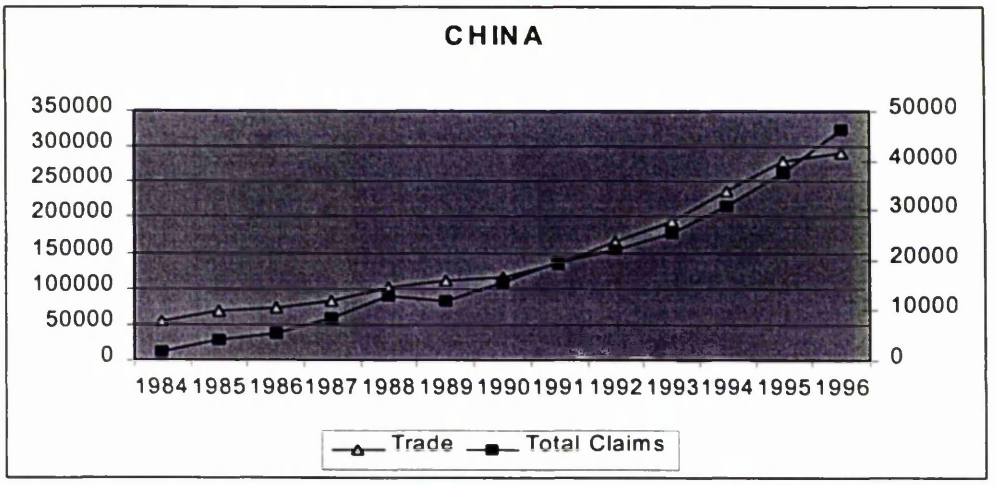
financial centre finances both domestic and regional economic activity. As discussed in the previous chapter, the evolution of the lending activity of a financial centre depends on transferability of technical knowledge across countries. When transferability of technical knowledge is complete, the financial centre would not specialise completely. In this case, we expect foreign and domestic financial activity to move together. On the other hand, when technology is not perfectly transferable, polarisation of financial activity, by which the centre finances either domestic or foreign financial activity, can occur. The above evidence is consistent with the hypothesis of complete transferability of knowledge.

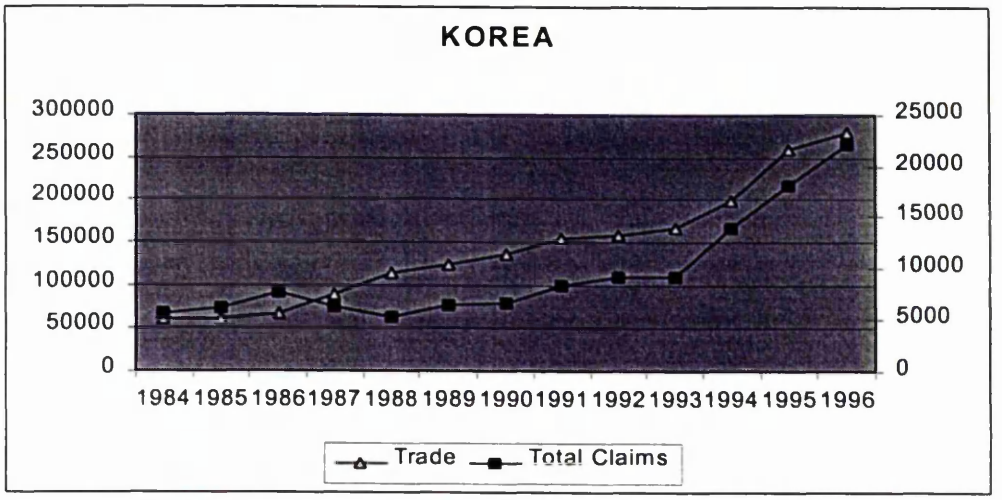
8.4 Conclusion

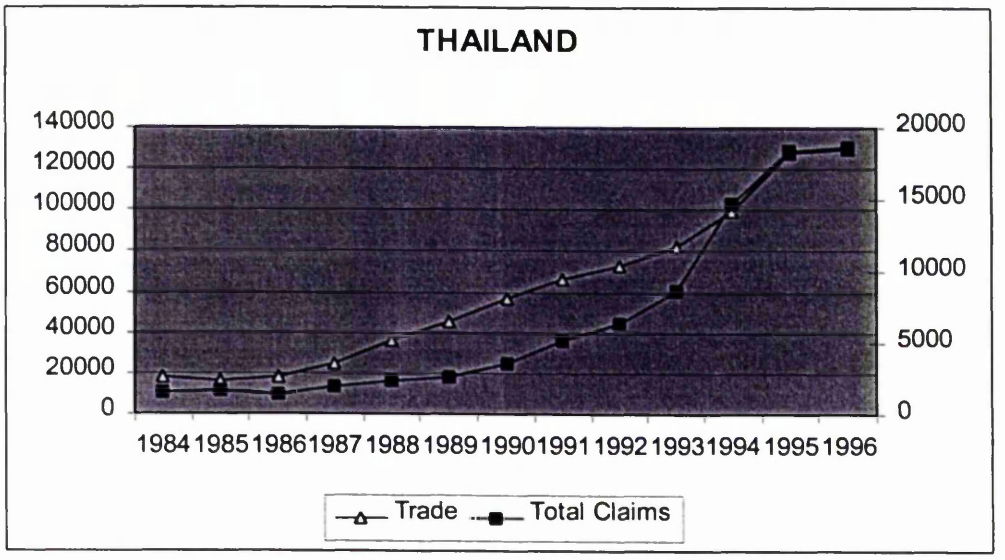
In this chapter, we provide two pieces of empirical evidence on the links between a financial centre and its regional economies, using Hong Kong as a study case. First, using two different data sets and various econometric techniques, we show that the large number of foreign banks in Hong Kong is related to regional and international trade rather than merely to Hong Kong's own trade activity. Specifically, trade links between a "home" country and Hong Kong cannot explain the number of banks from that country with a presence in Hong Kong. On the other hand, trade links with the region are found to be a major determinant of the number of banks there. Using cointegration analysis, this result is re-confirmed where we found a cointegrating vector between the number of offices in Hong Kong and regional trade activity with positive causality running from the latter to the former suggesting that the number of banks in Hong Kong is linked to trade activity in the region. Second, we explore the relationship between Hong Kong's financial development and regional economic activity. The empirical results reveal some interesting observations regarding the

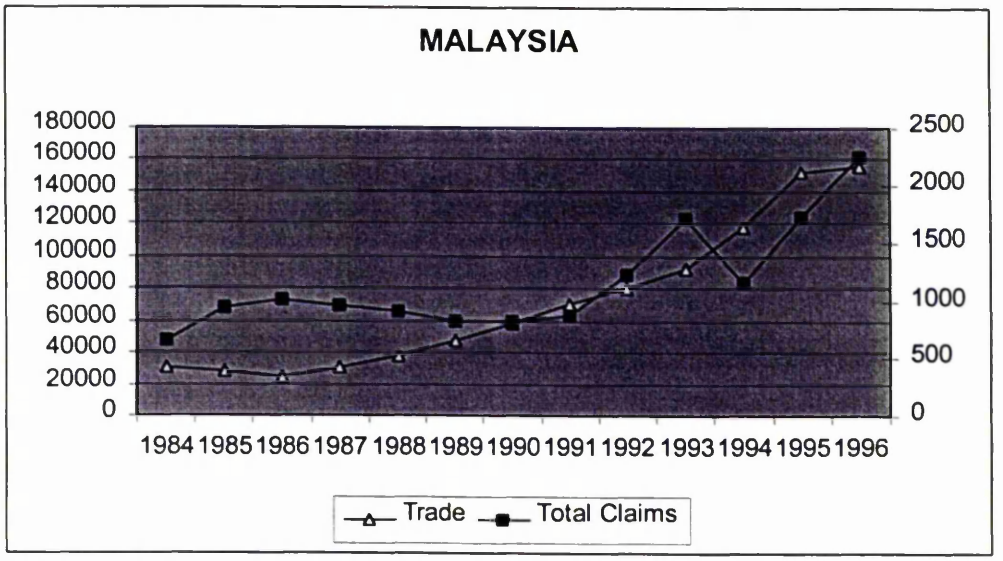
above relationship. First, they show that in the context of financial centres, it is important to differentiate between the domestic and external lending activity of the centre. A broad measure of financial development based on these two aspects of lending activity cannot be solely attributed to economic trends within Hong Kong itself and hence we are unlikely to find an overall meaningful relationship between financial and economic development. On the other hand, if we consider a narrower measure of financial development based on domestic lending activity only, then we are likely to find links between the level of domestic economic development and banking activity. The results also reveal a few interesting patterns regarding regional trade and Hong Kong's external lending activity. The results show that external banking development depends positively on the region's trade activity. Given Hong Kong's position as a financial centre which does not only attract deposits from abroad, but also arranges and extends Euroloans for its region, we expect that Hong Kong's external banking development to depend positively on the region's economic activity. The results also provide evidence which is consistent with complete transferability of knowledge in which the financial centre finances both domestic and regional economic activity.

APPENDIX: Hong Kong's External Assets against Individual Countries (China, Indonesia, Thailand, Malaysia and Korea) and Volume of Trade in each Country




KOREA
300000
250000
200000
150000
100000
50000
0
25000
20000
15000
10000
5000
0
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
Trade
Total Claims


THAILAND
140000
120000
100000
80000
60000
40000
20000
0
20000
15000
10000
5000
0
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
Trade
Total Claims


MALAYSIA
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
2500
2000
1500
1000
500
0
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
Trade
Total Claims

Chapter 9 - Conclusions

The purposes of this thesis have been, first, to provide a general framework to analyse the location of financial activity, second, to study the emergence and evolution of financial centres and finally, to test empirically several hypotheses related to banking centres. In this chapter, I describe the thesis's major contributions to the literature on banking centres and indicate some ideas for further research.

9.1 Agglomeration and Dispersion Forces in Banking Activity

In the first part of the thesis, we explore the impact of information asymmetry on the centralisation of credit activity. In contrast with existing models which analyse the process of financial intermediation in a space-dimensionless world, we incorporate spatial factors into recent models of financial intermediation. Specifically, we extend Williamson's (1986) model of credit rationing by making the additional assumption that monitoring costs are increasing and convex with distance. Based on this extended model, we show that there is a certain distance beyond which the profits of the bank would fall below the required return and as a consequence, the bank may decide to ration credit to borrowers located beyond that distance. In order for the bank to have access to previously credit rationed borrowers – for instance in an attempt to increase its market share - the bank may find it necessary to locate near borrowers. Given that the distribution of borrowers is highly scattered, information asymmetry can act as a powerful dispersion force.

We argue that this type of dispersion force is likely to be very strong in retail banking services while its impact is less on wholesale banking services for two main reasons. First, wholesale borrowers mainly MNC headquarters and other financial institutions

show a high degree of centralisation. Second, wholesale financial products are more standardised than retail services. These two factors enable banks to engage in cross border lending and deposit taking activity from a central location, typically a banking centre. It emerges from this analysis that although cross border lending activity and international branching occurred simultaneously during the last three decades, these two forms of expansion reflect the internationalisation of two types of banking activity: wholesale and the retail banking and it is only the former which is associated with the emergence of financial centres.

The literature on financial centres has mainly focused on technological externalities in the form of informational spillovers to explain the agglomeration of banks. While we recognise the importance of informational spillovers in enhancing the size and liquidity of interbank markets, we move the analysis one step further and examine other factors that may generate agglomeration force. Specifically, the main contribution of chapter 4 lies in exploring in details how pecuniary externalities can generate a powerful agglomeration force, using the insight of the emerging literature of economic geography. Using a simple model, we show how banks and other financial institutions' desire to employ a wide variety of specialised intermediate services and to have access to a pool of skilled labour force provide banks with incentive to locate near each other. Specifically, we explore the possibility of identifying a distinct producer service complex in banking centres similar to the one found in industrial centres. Although the importance of access to specialised intermediate inputs and skilled is recognised in the literature, the conditions under which these agglomeration forces are generated remain unexplored. For instance, in Chapter 4, we show that without the assumptions of internal economies to scale in the

service industry and non-tradability of intermediate inputs, these pecuniary externalities can't arise. These issues are completely ignored in the qualitative and historical analysis of financial centres.

Banking centres are usually characterised by a path dependence process which can act as a powerful agglomeration force. Chapter 5 contributes to the existing literature by analysing the path dependence process in banking centres in some details. Specifically, we extend Arthur's (1988, 1989) benchmark model by including in the general payoff some dynamic geographical benefits that contribute significantly to the attractiveness of banking centres. We emphasise three such dynamic benefits: the ability of a centre to reduce the cost structure for financial firms, to generate profitable business opportunities for them and to attract timely, reliable and useful information flows. Based on this dynamic framework, we show how self reinforcing mechanism generates multiple solutions to the location problem. We then analyse the conditions under which the path dependence process can be broken. Specifically, we show that a reduction in dynamic benefits over time due to a strong shock or due to a series of small shocks can place an established centre on a negative growth path.

9.2 Determinants of Banks' Location

Our empirical approach to the determinants of bank location involves a number of novelties. First, unlike the existing literature which tend to examine the location of bank all over the world, we focus more on the major determinants of banks' location in the world's largest banking centres. In order to do that, we construct an original index of financial diversity using new data series and aimed at ranking the importance of financial centres. The diversity index is then used to test the hypothesis that banks

locate in financial centres to participate in larger and more diversified financial markets and capture agglomeration benefits. Specifically, we test for the hypothesis that after controlling for bilateral trade, foreign direct investment, regulatory and tax factors and the country of the size of origin, *agglomeration benefits and greater access to deeper and liquid markets influence the banks' decision to establish in banking centres*. The importance of these two latter aspects, which we think are the most relevant for banking centre, has not been examined in the existing literature on financial centres. Second, our empirical approach also utilises more than one econometric technique. Specifically, we propose that given the nature of the hypothesis being tested, it is more meaningful to examine the impact of explanatory variables on the probability that a bank would establish abroad. Hence, we also estimate the empirical model using the probit and logit models. Finally, we distinguish between the different forms of physical presence in order to examine whether the same determinants can explain the number of subsidiaries, branches and offices.

The empirical results of chapter 6 reveal some interesting observations. They show that bilateral trade and the size of country of origin are important determinants of trade in banking offices. More importantly, the results show that after controlling for variations in regulatory and tax structure, the size of the country of origin and bilateral trade, banks' desire to capture agglomeration benefits and participate in larger and more diversified financial markets influence greatly their decision to establish offices in banking centres.

9.3 Emergence and Evolution of Banking Centres

The thesis also makes an important contribution by providing a theoretical framework to explain the emergence and evolution of banking centres. Specifically, in chapter 7, we build an original model of emergence of banking centres based on combination of efficiency and economies of scale in intermediation. This model allows to capture many important features of banking centres. First, unlike the existing literature which attributes the emergence of banking centres only to differences in regulatory and tax structure or other inherent geographical attributes, we emphasise the importance of economies of scale in financial intermediation as being the major determinant of emergence. In particular, in our model, comparative advantage - in terms of regulatory and tax concessions for instance- does not determine emergence on its own. Instead, emergence is directly linked to the ability of a centre to attract sufficient foreign savings and fund a critical mass of investment opportunities in the domestic economy and/or abroad. This allows for an element of indeterminacy in the model and hence other elements such as historical chance or "first mover" advantage can play an important role in determining which country emerges as a financial centre. It also allows for the possibility of co-ordination failure. For instance, if there is co-ordination failure such that surplus countries channel their savings through various countries, emergence of a regional centre could not occur. This suggest that the emergence of a certain country as a financial centre may be hindered by conditions that are beyond the control of national governments.

Chapter 7 also makes an additional contribution by examining the evolution of banking centres over time. This helps explain the major determinants of the nature of banking centres; an issue which is not explicitly addressed in the literature on

financial centres. Specifically, we show that when transferability of technical knowledge is complete, the banking centre funds both domestic and foreign production. On the other hand, when transferability of knowledge is incomplete such that economies can grow at different rates, polarisation may occur. As a result, a banking centre can either finance domestic production - an extreme case of an "inward transformer" where the financial centre transforms all foreign inflows into domestic loans - or finance foreign production -an extreme case of an "outward transformer" where the financial centre transforms all inflows into foreign loans.

9.4 Regional Links of Banking Centres

Another contribution of the thesis lies in exploring empirically the relationship between centres' banking development and regional economic activity. Although many economists suspect that there exist links between banking centres and regional economies, I am not aware of any study that puts this hypothesis to the test. Chapter 8 contributes to the literature by providing two pieces of empirical evidence on the links between banking centres and its regional economies, using Hong Kong as a study case. The following two important results emerge from the empirical results. First, the large number of foreign banks in Hong Kong is related to regional and international trade rather than merely to Hong Kong's trade activity. Specifically, trade links between a host country and Hong Kong cannot explain the number of banks from that country to Hong Kong. On the other hand, trade links with the region are found to be a major determinant of the number of banks there. Second, in the context of financial centres, it is important to distinguish between the domestic and external lending activity of the centre. Our empirical results suggest that a broad measure of financial development based on these two aspects of lending activity cannot be solely attributed

to economic trends within Hong Kong itself and hence we are unlikely to find an overall meaningful relationship between financial and economic development. In fact, the results show that Hong Kong's external banking development is positively linked to the region's trade activity.

9.5 Areas for Future Research

We conclude the thesis by identifying some areas for further research. As we have seen, the study of banking centres didn't attract the attention of economists. Hence, topics such as the importance of these centres in the world economy and their contribution to the domestic economy remain under-researched. One fruitful area for research consists of identifying the benefits and costs associated with attracting a large number of foreign banks. In this respect, it is important to note that most of the debate has focused on the "direct" benefits and costs associated with establishing a banking centre. A more fruitful avenue to explore is to examine the indirect effects of attracting foreign banks. Two such effects are worth mentioning. First, attracting foreign banks may allow national governments and domestic corporations to have a greater access to international capital markets. Second, foreign banks may improve the efficiency of the domestic banking system by inducing competition and introducing new banking practices and financial products. These two benefits are quite substantial and can provide justification for some policy makers to pursue policies aimed at establishing a banking centre. Assessing empirically the importance of these two benefits can prove very fruitful area for future research.

Another related fruitful area for research relates to the impact of banking centre on the process of industrialisation. Specifically, by introducing the industrial sector in the

model of chapter 7, it is possible to show that under certain circumstances, the development of a banking centre can lead to a de-industrialisation process by which labour moves from the industrial sector to the banking sector. This is likely to have important implications on the relationship between finance and growth. This interesting issue is worth some serious theoretical and empirical research.

Finally, a very fruitful area of research relates to the impact of financial agglomeration on regional economic development. For instance, the framework developed in this thesis can be easily modified to analyse the impact of differential treatment of borrower classes within one country and the consequences of large transfers of financial resources from the periphery to the centre. These complex issues deserve serious thinking and research, especially that they entail serious economic and social implications.

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